

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

— LOWER CHARLOTTE HARBOR —

Surface Water Improvement  
& Management Plan



— FEBRUARY 2008 —

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## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>INTRODUCTION.....</b>	<b>6</b>
<b>SECTION A.....</b>	<b>8</b>
<b>DESCRIPTION OF THE WATER BODY SYSTEM.....</b>	<b>8</b>
<b>SECTION B.....</b>	<b>33</b>
<b>LAND USES AND REGULATED ACTIVITIES.....</b>	<b>33</b>
<b>WITHIN THE LCH.....</b>	<b>33</b>
<b>GOALS, INITIATIVES, &amp; STRATEGIES FOR RESTORATION OR PROTECTION..</b>	<b>40</b>
<b>SECTION D.....</b>	<b>54</b>
<b>MEASURES NEEDED TO MANAGE AND MAINTAIN LOWER CHARLOTTE HARBOR WATERSHED .....</b>	<b>54</b>
<b>SECTION E.....</b>	<b>59</b>
<b>SCHEDULE &amp; FUNDING REQUIREMENTS FOR RESTORATION &amp; PROTECTION .....</b>	<b>59</b>
<b>BIBLIOGRAPHY .....</b>	<b>65</b>

<b>BIBLIOGRAPHY .....</b>	<b>65</b>
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## APPENDICES

<b>I. Governmental Units &amp; Implementation Partners.....</b>	<b>68</b>
<b>II. Surface Water Discharge Facilities Operating With a Permit.....</b>	<b>70</b>
<b>III. Facilities Possessing Multi-Sector General Permits .....</b>	<b>72</b>
<b>IV. Local Government Capital Improvement Project List.....</b>	<b>76</b>

## LIST OF FIGURES

<b>1. Plan Area of the Lower Charlotte Harbor (LCH) watershed, showing the four basins described in this report. ....</b>	<b>9</b>
<b>2. The Lower Charlotte Harbor Basin.....</b>	<b>11</b>
<b>3. The Tidal Caloosahatchee Basin .....</b>	<b>13</b>
<b>4. The Freshwater Caloosahatchee Basin .....</b>	<b>16</b>
<b>5. The Estero Bay Basin.....</b>	<b>18</b>
<b>6. Water Quality Monitoring Stations .....</b>	<b>22</b>

<b>7. Conservation Lands .....</b>	<b>28</b>
<b>8. 2000 Land Use/Land Cover .....</b>	<b>34</b>
<b>9. Estimated 2025 Land Use/Land Cover .....</b>	<b>35</b>

#### **LIST OF TABLES**

<b>1. Impaired Water Basin Management Action Plan Phases and Cycle Year.....</b>	<b>24</b>
<b>2. FDEP 303(d) Listed Waterbodies for the Lower Charlotte Harbor Basin .....</b>	<b>24</b>
<b>3. FDEP 303(d) Listed Waterbodies for the Tidal Caloosahatchee Basin .....</b>	<b>25</b>
<b>4. FDEP 303(d) Listed Waterbodies for the Freshwater Caloosahatchee Basin.....</b>	<b>26</b>
<b>5. FDEP 303(d) Listed Waterbodies for the Estero Bay Basin .....</b>	<b>26</b>
<b>6. Acreage in Conservation .....</b>	<b>27</b>
<b>7. Conservation Easements .....</b>	<b>29</b>
<b>8. 2000 Land Use, grouped by basin and major land-use category.....</b>	<b>33</b>
<b>9. Estimated 2025 Land Use, grouped by basin and major land-use category .....</b>	<b>36</b>
<b>10. Septic Tank Repairs for the Period 2000-2005.....</b>	<b>38</b>
<b>11. New Septic Tank Installations for the Period 2000-2005 .....</b>	<b>38</b>
<b>12. Opportunities for SFWMD TMDL Involvement.....</b>	<b>56</b>

## **EXECUTIVE SUMMARY**

### **Overview**

In recognition of the need to place additional emphasis on the restoration, protection and management of the surface water resources of the State, the Florida Legislature, through the Surface Water Improvement and Management (SWIM) Act of 1987, directed the State's water management districts to "design and implement plans and programs for the improvement and management of surface water" (Section 373.451, Florida Statutes). The SWIM legislation requires the water management districts to protect the ecological, aesthetic, recreational, and economic value of the State's surface water bodies, keeping in mind that water quality degradation is frequently caused by point and non-point source pollution, and that degraded water quality can cause both direct and indirect losses of aquatic habitats.

The South Florida Water Management District (SFWMD) ranked Lower Charlotte Harbor as a Tier 2 waterbody on the SFWMD priority list approved in 2001. On February 13, 2003, the SFWMD Governing Board designated Lower Charlotte Harbor a priority SWIM waterbody pursuant to Florida Statutes section 373.453 and authorized development of a SWIM Plan. The SFWMD defines Lower Charlotte Harbor (LCH) as the basins of Pine Island Sound, Matlacha Pass, East and West Caloosahatchee, Estero Bay, and the southern portion of Lower Charlotte Harbor. Please note that the Department of Environmental Protection (FDEP) represents these basins as one whole FDEP Basin (Caloosahatchee) and portions of two other FDEP basins (Charlotte Harbor and Everglades West Coast).

In preparation for development of the Lower Charlotte Harbor (LCH) SWIM Plan, a Lower Charlotte Harbor SWIM Reconnaissance Report was authorized in 2004. The objective of the Reconnaissance Report was to review and summarize existing information about area basins, also referred to as planning units, to identify the body of knowledge of current water quality, water quantity, and ecological features of the basins in the Lower Charlotte Harbor watershed. The intent of the report was to provide a meaningful resource for the development of the Lower Charlotte Harbor SWIM Plan.

The Reconnaissance Report, completed in May 2006 by the Charlotte Harbor National Estuary Program for the SFWMD, is a compilation and summary of information provided by both the Calusa Restoration Coordination Team (CRCT) and the authors. Data, report summaries, documents and information about ongoing programs in the LCH Watershed were identified and included in the Reconnaissance Report.

To develop this Lower Charlotte Harbor SWIM Plan, the Reconnaissance Report was used as the primary resource by a team of SFWMD staff members and an outside consultant to develop a draft Plan. Input on the draft Plan was solicited for and provided by government agency stakeholders (Appendix I) and other interested parties, through a workshop held in the vicinity of Lower Charlotte Harbor. This document represents the culmination of that effort.

## **Lower Charlotte Harbor Watershed Summary**

Lower Charlotte Harbor (LCH) is located on the lower west coast of Florida, on the Gulf of Mexico. The LCH extends 60 miles along the Gulf coast. It is 75 miles at its widest point, from the mouth of San Carlos Bay along the Caloosahatchee to Lake Okeechobee. The area includes the Cape Coral-Fort Myers Metropolitan Statistical Area.

The entire area is over 2,230 square miles and the land area is 1,900 square miles. Numerous creeks and rivers drain to form a series of bays, sounds, passes, and a natural harbor. These are separated from the Gulf by a series of barrier islands and passes. Major passes along the 45 mile stretch from Gasparilla Sound to San Carlos Bay include Little Gasparilla Pass, Boca Grande Pass, Captiva Pass, and Blind Pass. The major passes on Estero Bay include Matanzas Pass, Big Carlos Pass, Big Hickory Pass, Little Hickory Pass, and Wiggins Pass. (Antonini, et. al. 2002).

The natural hydrology has been altered by man-made canals, water control structures, drainage ditches, berms, and roads. In 1881, a hydraulic connection was dredged between the Caloosahatchee River and Lake Okeechobee, which is now called C-43 or the Okeechobee Waterway. The Intracoastal Waterway (ICW) runs from Lemon Bay in the north, through Pine Island Sound, crosses the Caloosahatchee Estuary and continues south through Estero Bay toward Naples. The basins comprising the LCH include Lower Charlotte Harbor , Tidal Caloosahatchee , Freshwater Caloosahatchee , and Estero Bay .

## **Conditions Leading to the Need for Restoration and Protection**

Within the LCH basin, the Gator Slough has been altered from a natural slough to a large canal. Stormwater is now delivered from the northeastern reaches of the watershed to an outfall located in Matlacha Pass, associated with Pine Island Sound. Drainage systems along US 41 in Charlotte County also tie into Gator Slough Canal. Water quality issues include rapid salinity change, nutrients pulsing, and turbidity.

Enhanced agricultural development due to the availability of irrigation water from the C-43 Canal, urban development in the Ft. Myers/Cape Coral area, and regulatory releases of freshwater from Lake Okeechobee have all been linked to significant water quality changes in the Caloosahatchee basins. Water quality parameters of concern include salinity, nutrients, turbidity, trace organics, and metals.

The Estero Bay basin has experienced rapid population growth, and threats to sensitive natural resources in the watershed as a result of the growth are a consideration. There is concern that urban development will affect the ecological integrity of the region.

Within LCH, a total of 40 out of 113 waterbodies are impaired for at least one parameter. Within the 40 impaired water bodies, there are a total of 72 impairments. Maps depicting

impaired parameters by basin and Water Body Identification Unit (WBID) are included in the Reconnaissance Report.

## **Overall Management Strategy**

The basic strategy of restoring, protecting and managing the surface water resources of the Lower Charlotte Harbor Watershed is through the use of a prioritized, objective, applied, sustainable, ecosystem or watershed approach with periodic public review and input.

The Lower Charlotte Harbor SWIM plan is organized around a system of goals, initiatives, strategies and action steps. In this system, the *Goals* are broad-based and identify objectives of SFWMD. *Initiatives* are general categories that have been used to divide the plan into distinct subject areas developed by SFWMD staff. *Strategies* are more detailed descriptions of the underlying work proposed to achieve results. They identify the approaches and methods that will be used to implement the initiatives. *Action Steps* represent specific activities under each strategy suggested to reach project delivery. Each *Action Step* has an associated estimate of the funding requirements and schedule for completion. These *Action Steps*, as well as the *Strategies* and *Initiatives* referenced above, are not mutually exclusive, and may be undertaken concurrently or sequentially.

The Lower Charlotte Harbor SWIM Plan focuses on the following six primary initiatives:

### **Initiative 1 – Water Quality**

This initiative consists of several distinct but interrelated strategies: the utilization of water quality monitoring data to evaluate sources of pollutants, the application of water quality models to evaluate the fate of water quality constituents, and the implementation of prioritized water quality enhancements for both 303(d) listed surface waters and other degraded waters.

### **Initiative 2 – Stormwater Quantity**

The expanded drainage area in the LCH, reduction of sheet flow and the periodic discharge of large quantities of fresh stormwater runoff into the major river systems in the LCH results in ecologically damaging changes in salinity throughout the estuarine areas of the watershed. This initiative focuses on mechanisms to reduce these excess flows and restore more natural timing and quantity of freshwater inflows to the watershed.

### **Initiative 3 – Watershed Master Planning and Implementation**

Watershed master planning is an evaluation of stormwater management in the geographic area and identification of problem areas, with detailed remedial actions generally derived using hydrologic models simulating water volumes and flows under a range of climatic conditions.

Implementation is the practical application of the information gained from master planning. For SFWMD, implementation includes assisting local governments in coordinating their plan implementation and construction

(implementation) of those projects through a prioritized stormwater retrofit program. The dual focus is on areas built prior to adoption of stormwater management regulations (1984), and areas with identified impaired waters. A key tool for implementation is solicitation of available federal and state funding and identification of other partnering opportunities.

#### Initiative 4 – Habitat Assessment, Protection and Restoration

This initiative consists of strategies to evaluate ancillary data needed to identify and provide habitat protection and restoration in the LCH. Additional data collection efforts for parameters such as benthic organism diversity, submerged aquatic vegetation distribution, and shellfish areas will be evaluated and implemented as necessary.

Through the results of data collection and analysis, opportunities for habitat restoration will be evaluated and potentially scheduled for implementation in the LCH.

#### Initiative 5 – Outreach

The LCH watershed encompasses a diverse region of urban, agricultural and environmental lands, and it is managed and regulated by numerous agencies and municipalities. Outreach, including both communication and coordination, is vital tool for SFWMD to efficiently and effectively meet the differing needs of these entities, while also meeting LCH SWIM goals. Through outreach, SFWMD can provide leadership with both the public and local governments.

#### Initiative 6 – Funding

Funding is an issue that occurs across all of the other initiatives. It is listed as a distinct initiative to highlight and acknowledge the need for long-term dedicated funding to reach plan goals. It also serves to coordinate funding within and across district areas of responsibility, as well as within each of the other initiatives in the LCH SWIM Plan.

In its mandate to address broad ecosystem needs, the LCH SWIM Plan attempts to accomplish comprehensive protection strategies within the LCH and introduce sustainable restoration strategies for resources or resource areas that are proven to be degraded. The intent is to also provide cooperative funding for projects addressing long-term waterbody protection and restoration.

A number of strategies and associated action steps were developed to fulfill the initiatives listed above. The strategies for each initiative are listed as follows:

#### **Water Quality Initiative**

- Strategy: Utilize the Existing Water Quality Monitoring Network to Assess the Origin and Fate of Pollutants
- Strategy: Hydrologic and Hydrodynamic Water Quality Modeling

- Strategy: Enhancement and Maintenance of Surface Waters

#### **Stormwater Quantity Initiative**

- Strategy: Improve the Timing of Freshwater Flows into Lower Charlotte Harbor
- Strategy: Regulatory Assessment

#### **Watershed Master Planning and Implementation**

- Strategy: Evaluate Existing Watershed Master Plans
- Strategy: Assist in the Development and Endorsement of Local Master Stormwater Plans and Implementation Schedules
- Strategy: Partner with Local Governments to Implement Existing Plans

#### **Habitat Assessment, Protection and Restoration Initiative**

- Strategy: Habitat Mapping and Resource Assessment
- Habitat Protection and Management
- Provide Habitat Enhancement and Restoration

#### **Outreach Initiative**

- Provide Public Education and Outreach
- Provide Regulatory Outreach

#### **Funding Initiative**

- Funding Development

The successful implementation of this plan is going to require staff resources and dedicated funding, along with financial commitment by local governments in the watershed. To accomplish all of the action steps in this endeavor, it is estimated that full implementation of the LCH SWIM Plan will cost \$15.07 million over the next five years. The following table shows funding estimates by initiative.

Initiative	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Water Quality	\$120K	\$400K	\$360K	\$285K	\$260K
Water Quantity	\$75K	\$120K	\$120K	\$30K	\$30K
Watershed Master Planning and Implementation	\$100K	\$135K	\$70K	\$50K	\$50K
Habitat Assessment, Protection, and Restoration	\$220K	\$500K	\$470K	\$445K	\$445K
Outreach	\$65K	\$55K	\$55K	\$55K	\$55K
Funding	\$2,100K	\$2,100K	\$2,100K	\$2,100K	\$2,100K
<b>Totals</b>	<b>\$2,680K</b>	<b>\$3,310K</b>	<b>\$3,175K</b>	<b>\$2,965K</b>	<b>\$2,940K</b>

This plan is a living document that will be updated periodically, especially to reflect findings and recommendations of the Southwest Florida Feasibility Study and the Northern Everglades legislation as it appropriately relates to the LCH watershed and its water quality improvements. Further updates are also anticipated as TMDLs are developed by FDEP.



## **INTRODUCTION**

### **The SWIM Act**

In recognition of the need to place additional emphasis on the restoration, protection and management of the surface water resources of the State, the Florida Legislature, through the Surface Water Improvement and Management (SWIM) Act of 1987, directed the State's water management districts to "design and implement plans and programs for the improvement and management of surface water" (Section 373.451, Florida Statutes). The SWIM legislation requires the water management districts to protect the ecological, aesthetic, recreational, and economic value of the State's surface water bodies, keeping in mind that water quality degradation is frequently caused by point and non-point source pollution, and that degraded water quality can cause both direct and indirect losses of aquatic habitats.

Under the SWIM Act, water management districts prioritize water bodies based on their need for protection and/or restoration. This prioritization process is carried out in cooperation with the Florida Department of Environmental Protection (FDEP), the Department of Agriculture and Consumer Services (DACS), the Department of Community Affairs (DCA), and local governments.

Following the selection of the priority water bodies, and in accordance with the SWIM Act, a SWIM Plan should be drafted, reviewed and approved before State SWIM funds can be spent on restoration, protection or management activities. Legislative appropriations provided to the Water Management Districts (WMDs) for surface water improvements and management activities are available for detailed planning, and plan and program implementation.

### **Lower Charlotte Harbor Plan Evolution**

The South Florida Water Management District (SFWMD) ranked Lower Charlotte Harbor as a Tier 2 waterbody on the SFWMD priority list approved in 2001. On February 13, 2003, the SFWMD Governing Board designated Lower Charlotte Harbor a priority SWIM waterbody pursuant to Florida Statutes section 373.453 and authorized development of a SWIM Plan. The SFWMD defines Lower Charlotte Harbor (LCH) as the basins of Pine Island Sound, Matlacha Pass, East and West Caloosahatchee, Estero Bay, and lower portion of Charlotte Harbor proper.

In preparation for development of the LCH SWIM Plan, a Lower Charlotte Harbor SWIM Reconnaissance Report was authorized in 2004. The objective of the Reconnaissance Report was to review and summarize existing information about area basins, also referred to as planning units, to identify the body of knowledge of current water quality, water quantity, and ecological features of the basins in the LCH watershed. The intent of the report was to provide a meaningful resource for the development of the LCH SWIM Plan. Participation was solicited in the project from government agency representatives and other stakeholders via meetings of the Calusa Restoration Coordination Team (CRCT) held in April, May, June and November 2005. The purposes of the meetings were to identify available information,

data, and their sources that should be included and to review and receive comments on the drafts of the Reconnaissance Report.

The Reconnaissance Report, completed in May 2006 by the CHNEP for the SFWMD, is a compilation and summary of information provided by both the CRCT and the authors. Data, report summaries, documents and information about ongoing programs in the LCH Watershed were identified and included in the Reconnaissance Report.

To develop this LCH SWIM Plan, the Reconnaissance Report was used as the primary resource by a team of SFWMD staff members and an outside consultant to develop a draft Plan. Input on the draft Plan was solicited for and provided by government agency stakeholders (Appendix I) and other interested parties, through a workshop held in the vicinity of LCH. This document represents the culmination of that effort.

## **Acknowledgements**

The LCH SWIM planning project was originally managed and edited by prior Carla N. Palmer, P.E., Stormwater Management Division Director for SFWMD. Liz Abbott, PMP, for SFWMD provided management assistance and co-edited the report, Molly Meadows, co-edited and produced the final adopted Plan. Denis W. Frazel, Ph.D. (Frazel, Inc.), assisted with the development and preparation of the Plan through the collaborative efforts of SFWMD staff. Special thanks are due to the following for their individual and collective efforts:

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Robert Chamberlain, Ph.D., Lead Environmental Scientist  
Steve Sentes, Section Supervisor  
Missie Barletto, Senior Intergovernmental Representative  
Clyde Dabbs, PG, Lead Geologist  
Cheol Mo, Ph.D., Lead Environmental Scientist  
Janice Tobias, Senior Administrative Assistant  
Damon Meiers, P.E., Stormwater Management Division Director

Special credit is due to the CHNEP for development of the LCH Reconnaissance Report, as well as their continued collaboration with SFWMD in ongoing water resources restoration and protection efforts.

An in-depth review and comment of the draft document was gratefully provided by Wayne Daltry, Director of Lee County Smart Growth.

Finally, SFWMD recognizes the efforts of David Burr, the late Executive Director of the Southwest Florida Regional Planning Council. For more than twenty years, Mr. Burr, a native Floridian, pressed for the development of a SWIM Plan for the LCH.

## **SECTION A.**

### **DESCRIPTION OF THE WATER BODY SYSTEM**

#### **A.1. Lower Charlotte Harbor Watershed**

Lower Charlotte Harbor (LCH) is located on the lower west coast of Florida, on the Gulf of Mexico. The LCH extends 60 miles along the Gulf coast. It is 75 miles at its widest point, from the mouth of San Carlos Bay along the Caloosahatchee to Lake Okeechobee. The area includes the Cape Coral-Fort Myers Metropolitan Statistical Area.

The entire area is over 2,230 square miles and the land area is 1,900 square miles. Numerous creeks and rivers drain to form a series of bays, sounds, passes, and a natural harbor. These are separated from the Gulf by a series of barrier islands and passes. Major passes along the 45 mile stretch from Gasparilla Sound to San Carlos Bay include Little Gasparilla Pass, Boca Grande Pass, Captiva Pass, and Blind Pass. The major passes on Estero Bay include Matanzas Pass, Big Carlos Pass, Big Hickory Pass, Little Hickory Pass, and Wiggins Pass. (Antonini, et. al. 2002).

The LCH area is composed of a variety of landscapes with urban development comprising approximately 18% of the total LCH area. The urban development is primarily concentrated at the mouth of the Caloosahatchee River in the southeastern section of the Charlotte Harbor basin, the southeastern and southwestern section of the Caloosahatchee Estuary basin, and in the western portion of the Estero Bay basin. Other smaller urbanized areas include the City of LaBelle, Moore Haven, and Clewiston in the Freshwater Caloosahatchee basin in Hendry and Glades Counties. Interspersed between these urbanized areas are sections of public conservation land, agricultural land, other native land habitats, uplands, floodplain and riverine wetlands, tidal marsh and open water.

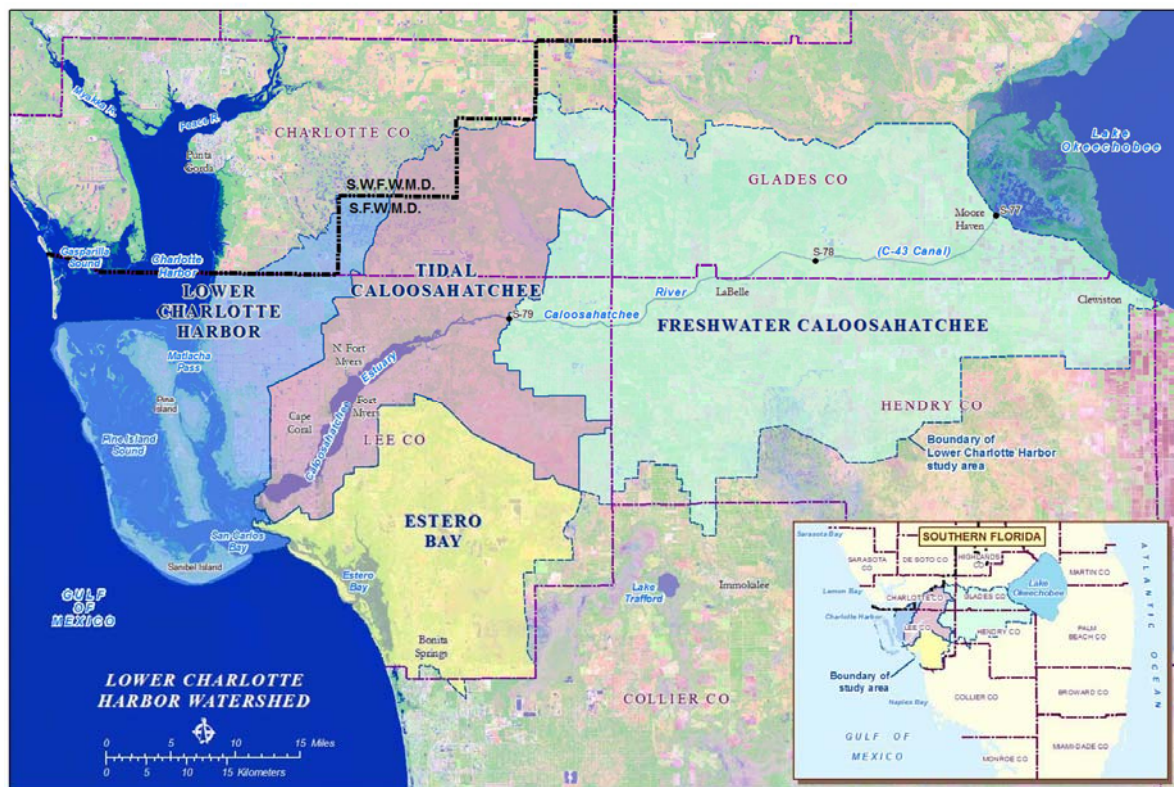
LCH includes more than 230,000 acres of managed public conservation areas, or 19% of the LCH land area, including the Babcock-Webb Wildlife Management Area, the Charlotte Harbor Buffer Preserve State Park, and the western part of the Corkscrew Regional Ecosystem Watershed (CREW). Agriculture covers approximately 29%, native land habitats 38%, and open water 15%.

Coastal areas, including Charlotte Harbor proper, contain expanses of seagrass beds, mangrove, and coastal strand communities. There are roughly 58,500 acres of seagrass in Charlotte Harbor (CHNEP 1996); this community provides important ecological functions that benefit many threatened and endangered species as well as migratory birds. Mangroves provide a variety of habitats and food resources for a diversity of animals, serve to hold and stabilize intertidal sediments, and provide erosion protection for adjacent uplands (FWS 1999).

The natural hydrology has been altered by man-made canals, water control structures, drainage ditches, berms, and roads. In 1881, a hydraulic connection was dredged between the Caloosahatchee River and Lake Okeechobee, which is now called C-43 or the Okeechobee Waterway. The Intracoastal Waterway (ICW) runs from Lemon Bay in the north, through

Pine Island Sound, crosses the Caloosahatchee Estuary and continues south through Estero Bay toward Naples. The basins comprising the SFWMD LCH (Figure 1) include Lower Charlotte Harbor (blue), Tidal Caloosahatchee (pink), Freshwater Caloosahatchee (green), and Estero Bay (yellow). Please note that the boundaries of both the Southwest Florida Water Management District (SWFWMD) and SFWMD (black dashed line) bisect the Lower Charlotte Harbor basin. This Plan is limited to that southern portion of the Lower Charlotte Harbor basin that is within the jurisdiction of SFWMD. Also note that the Department of Environmental Protection (FDEP) represents these basins as one whole FDEP Basin (Caloosahatchee) and portions of two other FDEP basins (Charlotte Harbor and Everglades West Coast) (not depicted).

**Figure 1. Plan Area of the Lower Charlotte Harbor (LCH) watershed, showing the four basins described in this report.**



## **A.2. Lower Charlotte Harbor Basin**

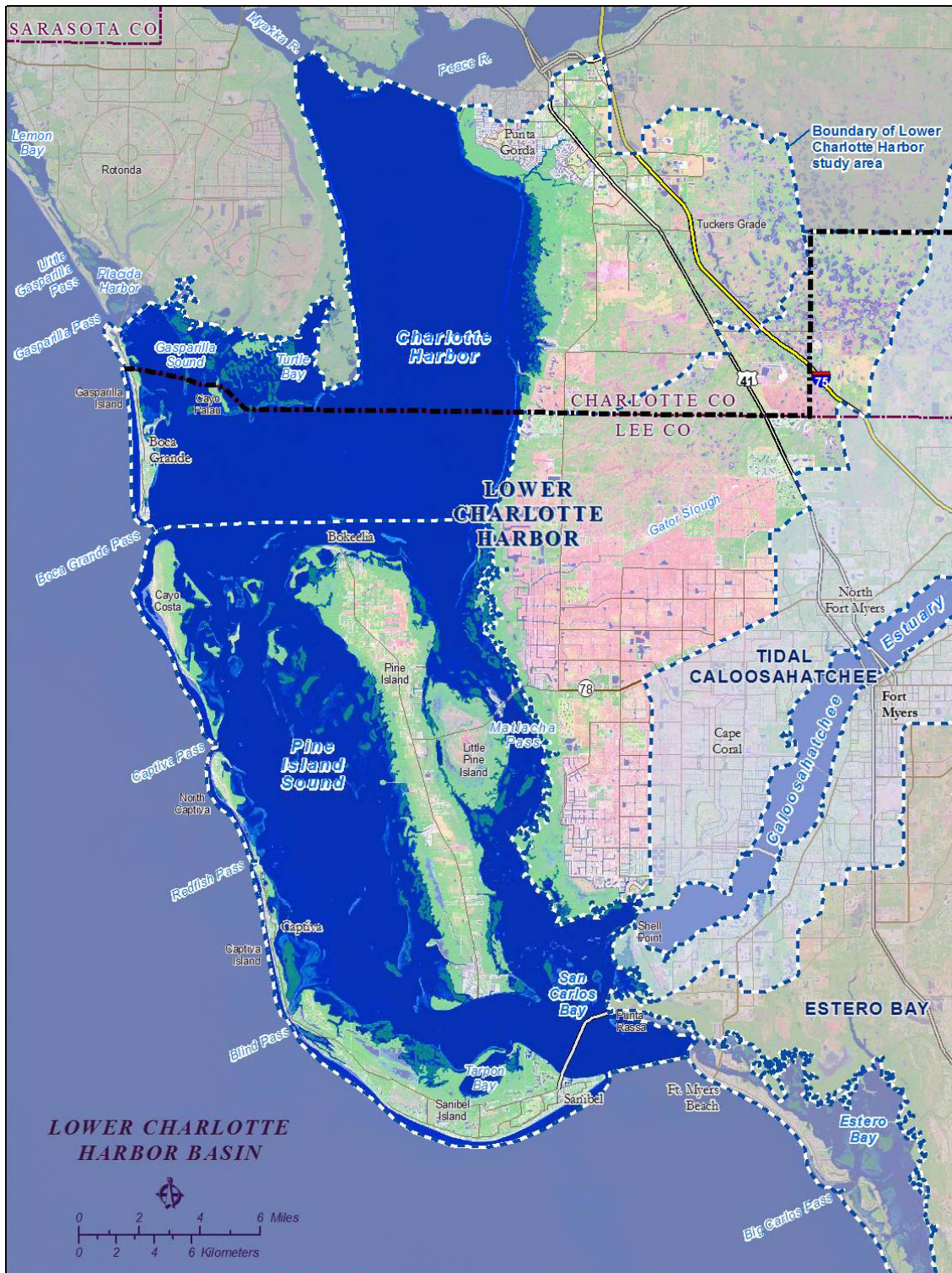
### **A.2.1. Introduction**

The Lower Charlotte Harbor Basin is a combination of Charlotte Harbor Proper and Pine Island Sound (Figure 2). Numerous creeks and rivers drain to form a series of bays, sounds, passes, and a natural harbor within this basin. These are separated from the Gulf by a series of barrier islands and passes. Major passes along the 45 mile stretch from Gasparilla Sound to San Carlos Bay include Little Gasparilla Pass, Boca Grande Pass, Captiva Pass, and Blind Pass.

The Gator Slough portion of the Lower Charlotte Harbor basin encompasses approximately 55 square miles. The watershed runs from Matlacha Pass in Lee County, northeasterly, to the vicinity of Tuckers Grade in the Cecil Babcock Webb Wildlife Management Area in Charlotte County.



**Figure 2. The Lower Charlotte Harbor Basin**



### **A.2.2. Historical Uses**

During the last century, tropical fruit farming and fish houses provided an economy for the larger islands of the Lower Charlotte Harbor basin, particularly Sanibel and Pine Island. The largely interconnecting freshwater sloughs on Sanibel created distinctive wildlife habitat and allowed early farming. Prior to 1963, all access to Sanibel was by water. In 1963, the Sanibel Causeway was built opening vehicular access to the island. Sanibel incorporated as a City in 1974.

Charlotte Harbor benefited from the passage of Florida's 1972 Environmentally Endangered Lands program. This program purchased large portions of the Charlotte Harbor and Matlacha buffer preserves. Also, a 1977 Consent Order between Gulf American Corporation (GAC) and the Department of Environmental Regulation further augmented one of the nation's largest protected mangrove systems.

### **A.2.3. Current Uses**

During the late 1950's early 1960's, GAC constructed a development which included creation of 400 miles of canals to provide waterfront property for what has today become the City of Cape Coral. Running diagonally through the City is a canal known today as the Gator Slough Canal. Prior to the construction of the GAC development, surface water flowed in a southwest direction into the Pine Island Sound.

### **A.2.4. Conditions leading to the need for restoration & protection**

With the advent of the GAC canal construction, Gator Slough was altered from a natural slough to a large canal. Stormwater is now delivered from the northeastern reaches of the watershed to an outfall located in Matlacha Pass, associated with Pine Island Sound. Drainage systems along US 41 in Charlotte County also tie into Gator Slough Canal.

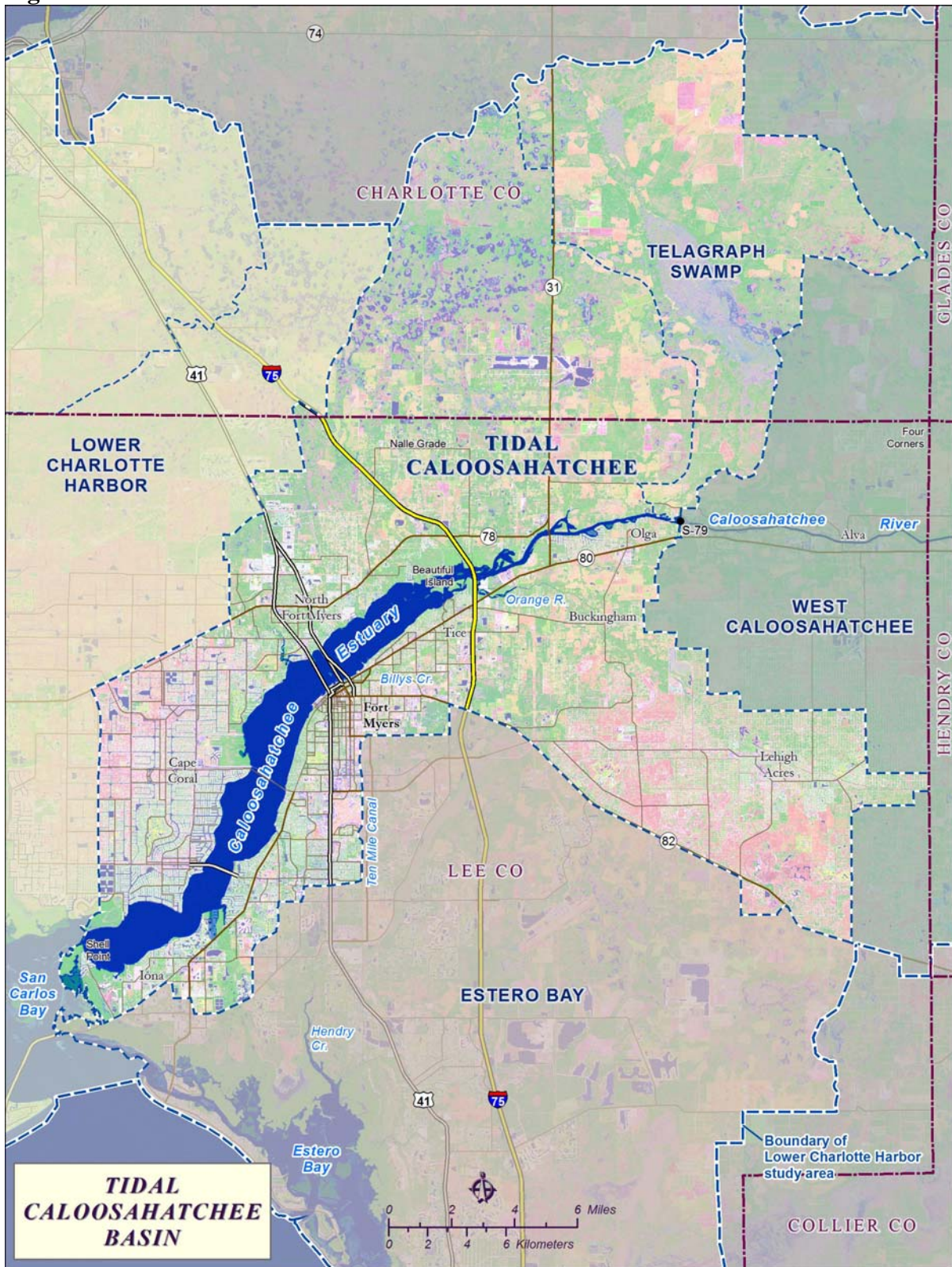
## **A.3. Tidal Caloosahatchee Basin**

### **A.3.1. Introduction**

The final downstream structure on C-43, S-79, defines the beginning of the Tidal Caloosahatchee Estuary. The Tidal Caloosahatchee Estuary (Figure 3) extends west and south for about 26 miles to Shell Point, adjacent to San Carlos Bay, Pine Island Sound, Charlotte Harbor to the northwest, and Estero Bay to the southeast. The open waters of the Gulf of Mexico are located just outside of San Carlos Bay south and west of Sanibel Island.



**Figure 3. The Tidal Caloosahatchee Basin**





### **A.3.2. Historical Uses**

Originally named Fort Harvie, Fort Myers was renamed after Colonel Abraham C. Myers around 1850. Fort Myers was abandoned by the military after its occupation by federal troops during the Civil War from 1863-1865. After the war, the economy of the area was built on lumber, cattle, and the Cuban gold used to pay for the cattle. In the late 1800's, pineapple plantations were created along the Caloosahatchee River. Lee County was established in 1884, just one year after Henry Disston dredged a small channel connecting the Caloosahatchee to Lake Okeechobee.

In the early 20<sup>th</sup> century, a building boom was fueled by the arrival of the Coast Railroad. Several hotels and residential developments were built during this time, including Edgewood, Wardwood Grove, and what is now known as Dean Park. By 1919, the streets in downtown Fort Myers were paved. The Tamiami Trail linking Tampa to Miami through Fort Myers was built in the early 1920's.

By the late 1920's, Fort Myers adopted a City Plan, prepared by Herbert S. Swan, which documented the concerns and priorities of the residents. The Caloosahatchee River was described as undesirable for swimming "not only on account of marine life in these waters, which is disturbing to bathers, but also on account of the pollution in the river." The source of drinking water at the time was not the Caloosahatchee but rather artesian wells.

From the 1930's to 1950's, development outside the cities was scattered, consisting mainly of homesteading families that either cattle ranches or farmed. However, the presence of the Air Force training base at Buckingham during World War II introduced many to the area.

The development of Cape Coral began in 1957, when Leonard and Jack Rosen, land speculators from Baltimore, purchased over 100 square miles of undeveloped land between the Caloosahatchee River and Matlacha Pass for \$678,000. The Rosen brothers' company, the Gulf American Corporation (GAC), began by developing the land around Redfish Point, which today is the location of the Cape Coral Yacht Club. By 1958, the first resident had moved in and development progressed rapidly with extensive dredge and fill operations. The peninsula that had been known only to hunters, fisherman, and a few homesteaders was eventually converted from its original pine flatwoods, freshwater wetlands, and mangrove forest/salt marsh fringe, into the second largest city by land area in Florida. The development actions created over 400 miles of canals (300 miles freshwater and 100 miles saltwater), 1,700 miles of roads, and about 350,000 platted lots.

### **A.3.3. Current Uses**

The tidal Caloosahatchee area is currently dominated by the urbanized areas of Cape Coral, Fort Myers, and North Fort Myers. Urban expansion is expected to continue west and north along the US 41, I-75 corridor.

#### **A.3.4. Conditions leading to the need for restoration & protection**

Enhanced agricultural development due to the availability of irrigation water from the C-43 Canal, urban development in the Ft. Myers/Cape Coral area, and regulatory releases of freshwater from Lake Okeechobee have all been linked to significant water quality changes in the Caloosahatchee Estuary (Flaig and Capece 1998; Chamberlain and Doering 1998; Doering and Chamberlain 1998; Doering and Chamberlain 1999, Barnes *et al.* 2003; ERD 2003; FDEP 2003). Water quality parameters of concern in the Caloosahatchee Estuary include salinity, nutrients, turbidity, trace organics, and metals (SFWMD 2005).

### **A.4. Freshwater Caloosahatchee Basin**

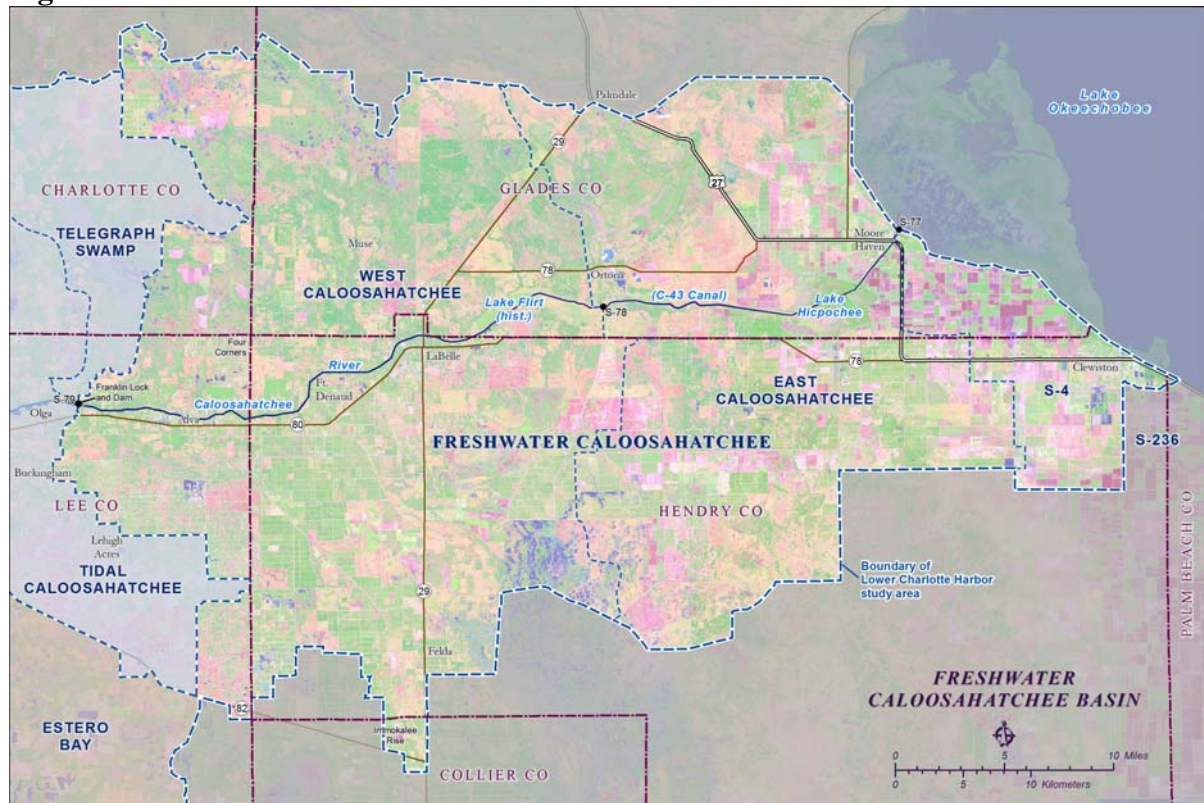
#### **A.4.1. Introduction**

The Freshwater Caloosahatchee River Basin (Figure 4) currently extends about 42 miles from Lake Okeechobee to S-79. This waterbody segment is defined as the freshwater Caloosahatchee River rather than the C-43 Canal. The final downstream structure on the freshwater Caloosahatchee River, S-79 (also known as the Franklin Lock and Dam), defines the beginning of the Tidal Caloosahatchee Estuary.

The Freshwater Caloosahatchee River Basin can be functionally divided into East and West segments. The East Caloosahatchee Basin includes 379 mi<sup>2</sup> and extends from Moore Haven (S-77) upstream to Ortona (S-78) downstream. This area includes the 62 mi<sup>2</sup> S-4 Basin and the 16.5 mi<sup>2</sup> S-236 Basin. The West Caloosahatchee Basin includes 558 mi<sup>2</sup> and extends from Ortona (S-78) to the S-79 downstream. The Telegraph Swamp Basin includes an additional 88 mi<sup>2</sup>, its outfall just downstream of S-79. The freshwater portion of the Caloosahatchee River ranges from about 165 to 430 ft in width and 19 to 28 ft deep. Many of the original oxbows still exist outside the footprint of the C-43 Canal (SFWMD 2005).

The major physiographic provinces of the Caloosahatchee River subregion are the Caloosahatchee Valley, Gulf Coast Lowlands, DeSoto Plain and the Immokalee Rise (Southwest Florida Regional Planning Council 1995). Within this subregion, the Immokalee Rise includes most of Hendry County and eastern Lee County. It is about 25 ft in elevation, but can peak at 36 ft and 43 ft in some areas. All of the soils within the Caloosahatchee River subregion are deep, nearly level, and poorly drained, with a water table less than 10 inches from below the surface during at least part of the year (SWFRPC 1995).

**Figure 4. The Freshwater Caloosahatchee Basin**



#### **A.4.2. Historical Uses**

In pre-development times, the Caloosahatchee River was a smaller, shallow, meandering system originating at the west end of Lake Flirt with headwaters near Lake Hicpochee (Science Subgroup 1996), and extending to Beautiful Island in Ft. Myers. East of Lake Flirt, there was only sawgrass marsh extending to Lake Okeechobee with evidence of Indian canoe trails. The area was subject to prolonged flooding, and cattle ranching was the primary human land use in the basin. Intensive agriculture was not a major land use in the watershed until large scale drainage projects were constructed. The Disston Canal was created in 1884 when the Caloosahatchee River was extended to Lake Okeechobee by dredging. In 1937, additional channelization occurred with the construction of the lock and dam structures at Moore Haven (S-77) and Ortona (S-78). Final drainage changes occurred with final widening and construction of the C-43 Canal in the 1950's and completion of the Franklin Lock and Dam (S-79) in 1966 (Flaig and Capece 1998).

The first drainage districts within the Lower Charlotte Harbor study area, the Clewiston Drainage District and the Sugarland Drainage District, were created in 1924. A levee was completed next to Lake Okeechobee in late 1925 to prevent flooding in Clewiston.

In 1928, the "West Indian Hurricane" struck, and although the dike and pump system generally protected Clewiston, the storm surge breached the dike in other areas surrounding Lake Okeechobee, flooding hundreds of square miles. It was devastating to the area, with at least 2,500 lives lost in Florida. It was second deadliest hurricane to hit the U.S. After the

storm, federal and state funds were authorized to conduct major dredging, build locks and extend the dike around Lake Okeechobee.

The authorized project was known as the Caloosahatchee River and Lake Okeechobee Drainage Areas Project (CR&LODA), and the funding authority came from the 1930 federal Rivers and Harbors Act. This act essentially resulted in construction of the levees to completely surround the lake and enlarging the capacity of both major outlets to tide: the St. Lucie River to the east and the Caloosahatchee River to the West. This provided an economic boost to Clewiston in the midst of the depression. With the passage of the Flood Control Act of 1948 (Public Law 858, 80th Congress, 2nd Session), the CR&LODA was expanded and enlarged into what is known today as the Central and Southern Florida (C&SF) Flood Control Project. (USACOE, 1999).

#### **A.4.3. Current Uses**

Today, the freshwater Caloosahatchee River extends approximately 71 mi from Lake Okeechobee to the Franklin Lock and Dam (S-79), as a channelized flood control and navigational waterway. The river is supplied by inflows from Lake Okeechobee and runoff within its own basin.

Urban development is spreading east along Caloosahatchee River from east of Fort Myers toward Labelle. Around LaBelle and further east, agriculture is more predominant with cattle farming, row crops, sugarcane, and citrus accounting for most of the economic production.

#### **A.4.4. Conditions leading to the need for restoration & protection**

Regulatory releases of freshwater from Lake Okeechobee, increases in nonpoint source urban runoff associated with increased development in the areas of LaBelle, Moore Haven and Clewiston, and agricultural runoff (drainage) elsewhere along the freshwater Caloosahatchee, are impacting the Caloosahatchee River. As with the Tidal Caloosahatchee, water quality parameters of concern include; nutrients, turbidity, trace organics, and metals (SFWMD 2005).

### **A.5. Estero Bay Basin**

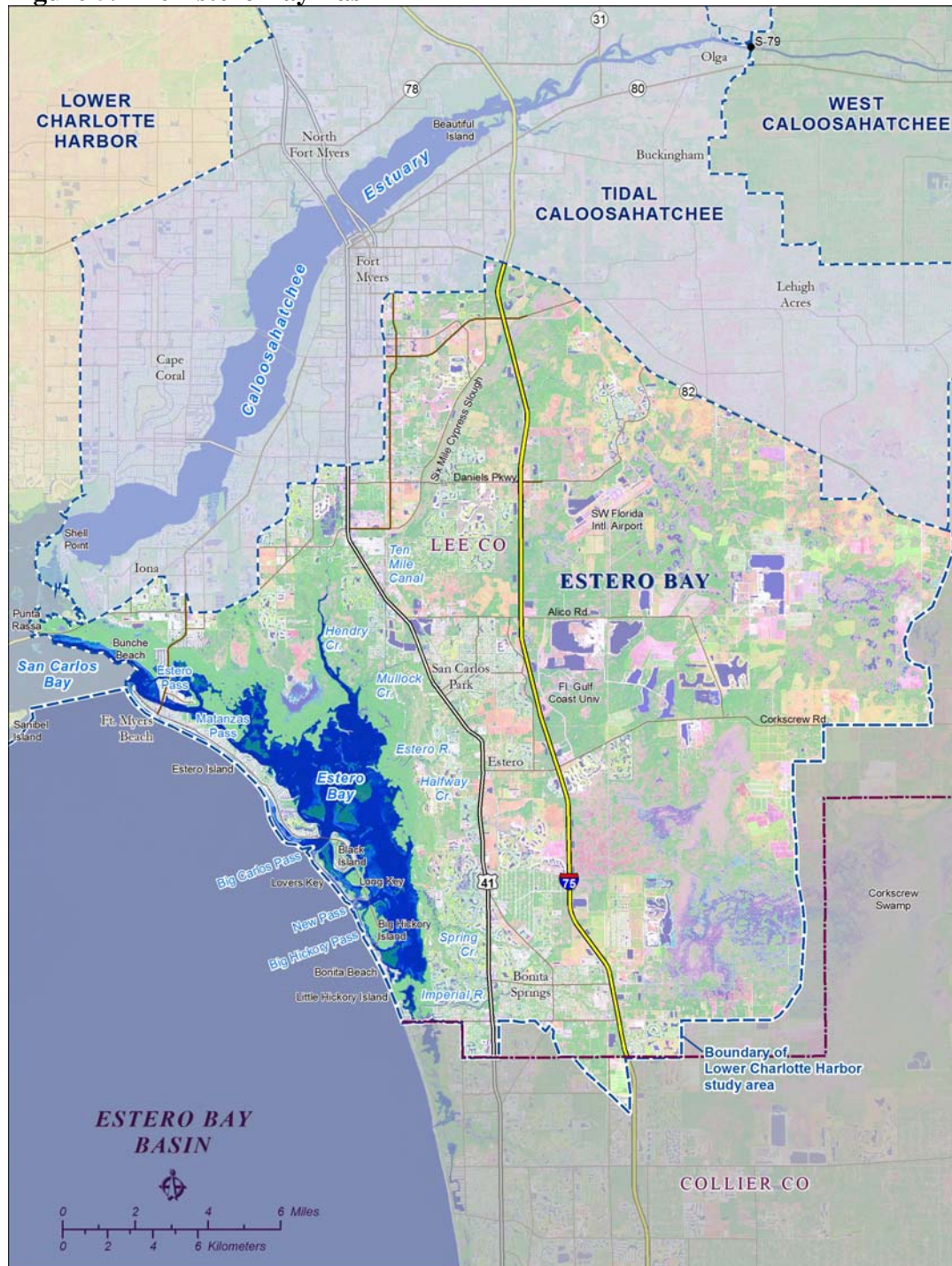
#### **A.5.1. Introduction**

The Estero Bay Basin in southwestern Lee County (Figure 5), consists of Estero Bay, the watershed draining to the bay, and associated barrier islands. Estero Bay is a shallow, subtropical estuarine lagoon, approximately 14 mi<sup>2</sup> in area. Five creeks and rivers drain into the bay including Hendry Creek, Mullock Creek, Estero River, Spring Creek, and Imperial River. The Six-Mile Cypress Slough subbasin (2.6 mi<sup>2</sup>) is in central Lee County. The barrier islands separating Estero Bay from the Gulf of Mexico include; Estero Island, the Lovers Key complex (Long Key, Lovers Key, Black Island), Big Hickory Island, Little Hickory Island, and Bonita Beach Island (CHNEP 1996).



Located in the northern half of Estero Bay is Florida's first aquatic preserve is Estero Bay Aquatic Preserve, which was dedicated in 1996. Estero Bay contains several natural plant community types, the most dominant being mangrove forests. Salt marshes, seagrasses, oyster bars and tidal flats are also common. The estuary also serves as a nursery area for a variety of commercial and sport fisheries. It is also an important home for bird nesting colonies and a valuable stopover for migrating birds.

**Figure 5. The Estero Bay Basin**



### **A.5.2. Historical Uses**

Historically, the Estero Bay basin was approximately 3,150 acres smaller than today and was mostly uninhabited. In the late 1800's there were a few settlers on Mound Key in Estero Bay that were subsistence fishermen. In the early 1900's these families moved upriver to what is now Estero.

The boundaries of Estero Bay were increased when 10-mile Canal was dredged in the 1920's. The dredging began as a source of fill to create a dike to protect Fort Myers from flooding from sheetflow from the east of the city. The canal was extended over the course of the next several decades.

Between 1969 and 1975, conservationists struggled with developers to protect wetlands of the Estero Bay Aquatic Preserve (EBAP). In 1969, a boundary line agreement between the State of Florida and property owners allowed the sale of more than two thousand acres of aquatic preserve to private ownership. In 1972, Robert B. Troutman, Jr. (an Atlanta attorney) attempted to develop a condominium project on a 5,240 acre tract of marshland and mangroves on Estero Bay. Conservationists filed suit against the state to have the boundary line nullified. By 1975, the Florida Aquatic Preserve Act was passed and the existing preserves were brought under a standard set of management criteria.

### **A.5.3. Current Uses**

Urban land use in the basin is primarily located in the central developed corridor along U.S. Highway 41 and Interstate 75. The major wetland systems are located in the western parts of the basin, while the agricultural uses are located on the eastern boundaries of the basin. Urban development is occurring in the central portion of the watershed. Acquisition of sensitive lands for preservation is being addressed via programs such as the Corkscrew Regional Ecosystem Watershed (CREW) and Preservation 2020.

### **A.5.4. Conditions leading to the need for restoration & protection**

Population growth in the Estero Bay Watershed has been rapid, and threats to sensitive natural resources in the watershed as a result of the growth are a consideration. There is concern that urban development will affect the ecological integrity of the region.

## **A.6. Hydrology**

### Lower Charlotte Harbor Basin

The Charlotte Harbor estuarine system, which extends across the jurisdictional boundaries of both SWFWMD and SFWMD, covers an area of about 270 square miles, averages about 7 feet in depth and is connected to deep water of the Gulf of Mexico through several passes and inlets between barrier islands. Three major rivers flow into the estuary--the Peace, the Myakka, and the Caloosahatchee. Freshwater and tidal flushing transport nutrients and other constituents from the basin through the estuary into the gulf. The estuary is usually well

mixed or partially mixed in the vertical, but vertical salinity stratification does occur, primarily during late summer when freshwater inflows are greatest. The distribution of plant nutrients in the Charlotte Harbor Estuary is affected by nutrient inputs, freshwater and tidal flushing, mixing, and recycling processes in the estuary. The distributions of total phosphorus and orthophosphate are affected mainly by river input and physical mixing. The distribution of ammonia nitrogen is variable and is related more to recycling within the estuary than to input from the rivers. Ammonia concentrations increase in deeper water, probably in response to vertical salinity stratification and low concentrations of dissolved oxygen that foster regeneration of ammonia from bottom sediments. The distribution of nitrite plus nitrate nitrogen is nonconservative--concentrations are high in the rivers and decrease more rapidly in the estuary. One factor for this decrease in nitrogen concentrations is dilution with sea water. Another factor for the decrease is likely due to phytoplankton uptake (McPherson et al. 1996).

#### Caloosahatchee Basins

The Tidal Caloosahatchee makes up 30% (268,000 acres) of the watershed area (903,000 acres) and generates 28% (340,000 acre-feet per year) of the total watershed runoff (1,234,000 acre-feet per year). Historically, regulatory releases from Lake Okeechobee add an additional 24% (297,000 acre-feet per year) – mostly at high rates of inflow (SFWMD 2003).

Rainfall averages about 52 in/yr in the Caloosahatchee Basin. Yearly rainfall was highly variable, ranging from about 30 to 80 in/yr during the period of record from 1931 to 2001. Rainfall is also seasonal with a dry season typically extending from November through April and a wet season extending from May through October. Tropical storms and hurricanes may contribute record rainfall amounts during late summer and early fall periods (SFWMD 2005).

Annual runoff from the Caloosahatchee Basin was estimated at about 20% of average annual rainfall over a 10-year period from 1970 to 1979 (USGS 1983). Average flows increase with travel distance downstream from S-77 at Moore Haven (734 cubic feet per second (cfs)) to S-79 just upstream of Ft. Myers (1,730 cfs) primarily in response to non-specific inputs from the surrounding watershed. Annual flow variation at these stations is great in response to rainfall within the watershed and due to regulatory releases from Lake Okeechobee at S-77. Peak annual average discharges range from about 2,600 cfs at S-77 to about 4,700 cfs at S-79. Maximum daily discharges at the three structures ranged from 8,816 cfs at S-77 to 21,400 cfs at S-79 (SFWMD 2005).

#### Estero Bay

Historically, sheet flow from several sloughs drained into Estero Bay. Most flow now is concentrated at several inflow points as a result of rapid development within the watershed. The principal inflows come from Hendry Creek, Mullock Creek, Estero River, Spring Creek, and Imperial River. Water exchange with the Gulf of Mexico is restricted by the barrier islands, with most exchange through four passes; Matanzas Pass, Big Carlos Pass, New Pass, and Big Hickory Pass.

Salinity data reveal that large volumes of water from the Caloosahatchee River periodically moving a short distance through San Carlos Bay and then into Estero Bay through Matanzas Pass. Water entering the northeastern part of the bay travels south and mixes with water from the Estero River before flowing through Big Carlos Pass. In the south-central bay, hydrologic exchange is limited and salinities increase. Salinity data in southern Estero Bay suggest the Imperial River discharges to the south and north in similar volumes. The Imperial River discharge leaves Estero Bay through Big Hickory Pass and New Pass (Byrne 2003).

#### **A.6.1. Water Quality**

##### **Monitoring**

In Southwest Florida, water quality data are collected by numerous agencies and volunteer organizations, including USGS, the Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network, FDEP, Florida Fish and Wildlife Conservation Commission, Lee County, Lee County Hyacinth Control District, City of Cape Coral, and the Charlotte Harbor National Estuary Program. All of these entities have water quality monitoring programs that sample at varying frequencies for various core constituents. These samples are normally placed into the State of Florida central database, the STORage and RETrieval (STORET) system.

SFWMD currently maintains a monitoring program of 4 fixed stations within the Caloosahatchee River that was established in April 1999. Originally, the SFWMD sampled 8 sites but this was changed in 2002 to the 4 fixed stations when the Coastal Charlotte Harbor Monitoring Network started sampling the river. Water quality samples are collected monthly and used to produce annual technical reports on the current status and trends of several nutrients and physical attributes of the system, provide supporting data for water supply modeling, and contribute to a growing body of regional data.

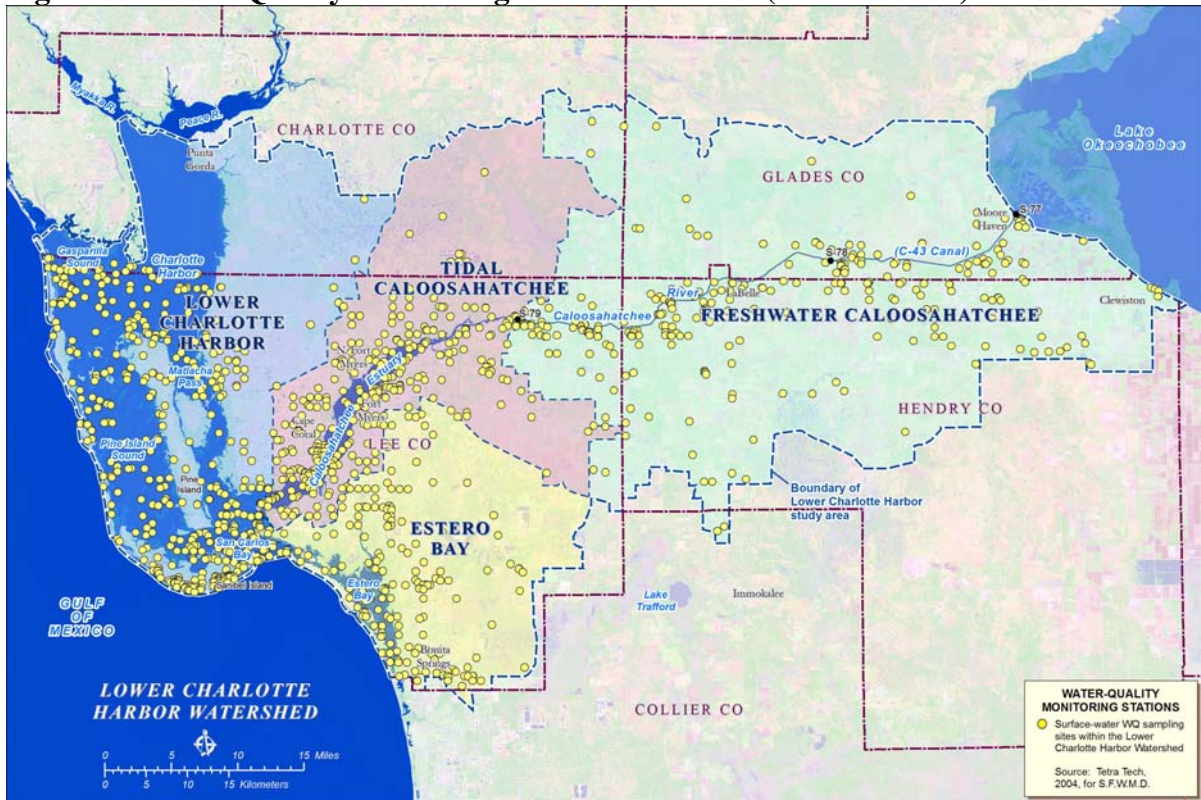
In addition, SFWMD maintains a central environmental database, similar to STORET named DBHYDRO that stores hydrologic, meteorologic, hydrogeologic, and water quality data. It contains data collected by the SFWMD and other agencies and organizations. To assess water quality within 16 South Florida counties, the SFWMD monitors surface water in a variety of locations, including canals, pump stations, agricultural discharges, and many other types of aquatic environments. The District also monitors sediments and fish for a variety of pollutants, including nutrients, trace metals and pesticides, which can be conveyed by water.

The Southwest Florida Feasibility Study developed by the SFWMD jointly with the US Army Corps of Engineers includes a water quality analysis completed June 2004, entitled "Compilation, Evaluation, and Archiving of Existing Water Quality Data for Southwest Florida." The work was completed by TetraTech with the assistance of Janicki Environmental, Inc. This report is an extensive listing of water quality data available as of early 2004 throughout the entire lower southwest Florida region. Each set of data is evaluated for quality and the times and parameters tested are detailed. The location of the data is also



provided, with a large percentage in the DBHYDRO database. Surface water quality sampling sites within the Lower Charlotte Harbor Watershed are shown in Figure 6.

**Figure 6: Water Quality Monitoring Station Locations (CHNEP 2003)**



## **Impaired Waters**

Section 303(d) of the Clean Water Act (CWA) requires states to list waters that do not meet applicable quality standards and establish Total Maximum Daily Loads (TMDLs) for those waters on a prioritized schedule. TMDLs establish the maximum amount of pollutants a water body can assimilate without exceeding water quality standards. In 1998, EPA approved Florida's 1998 303(d) Impaired Waters list, which was based either on existing, readily available data or best professional judgment. State waterbodies were on the 1998 303(d) list.

However, in 1999, the Florida Watershed Restoration Act, Section 403.067, FS was enacted by the Florida Legislature. This law requires FDEP to adopt, by rule, a scientific methodology for analyzing environmental data and determining whether a waterbody is impaired or healthy. All waterbodies on the 1998 303(d) list are required to be either 1) verified as impaired, 2) de-listed if they are meeting water quality standards, or 3) placed on a planning list if insufficient data exist (Category 3).

FDEP's 2002 update to Florida's 1998 303(d) Impaired Waters List for Group 1 Basins with sufficient data (Category 5) was amended in August 2002 by Secretarial order and submitted to EPA October 2002. The verified list was adopted March 11, 2003 by Secretarial order. The 2002 update was developed in accordance with EPA guidelines for Integrated Water

Quality monitoring and Assessment Reports. Group 1 included Everglades West Coast, a portion of which is Estero Bay.

FDEP's 2004 update to Florida's 1998 303(d) Impaired Waters List for Group 2 Basins with sufficient data (Category 5) was adopted May 27, 2004 by Secretarial order, including Charlotte Harbor, a portion of which is Charlotte Harbor, Pine Island Sound, and Matlacha Pass.

FDEP's 2005 update to Florida's 1998 303(d) Impaired Waters List for Group 3 Basins with sufficient data (Category 5) was adopted June 20, 2005 by Secretarial order, including the Caloosahatchee basin.

The Florida Watershed Restoration Act addresses processes for refining the list for calculating and allocating TMDLs. According to EPA guidelines, waters expected to attain and maintain applicable water quality standards through other Federal, State, or Local requirements do not need to be included on the 303(d) list pursuant to approval of "Reasonable Assurance."

In Florida, the Clean Water Act (CWA) is implemented through the Watershed Restoration Act of 1999 (FS 403.067). The state's Impaired Waters Rule (IWR) was adopted in 2001 as Chapter 62-303, Florida Administrative Code. The IWR establishes a methodology to identify surface waters of the state that will be included on the state's planning list of waterbodies. It also establishes a methodology to identify impaired waters that will be included on the state's verified list of impaired waters, for which the FDEP will calculate Total Maximum Daily Loads (TMDLs).

FDEP decided to implement the TMDL program using a watershed approach (i.e., managing water resources within their natural boundaries). To implement the watershed approach for all water bodies in Florida, FDEP divided each of the six FDEP Districts into five geographically based groups of watersheds, and a five-year rotation of assessment, analysis, and implementation was established. In 2000, FDEP began addressing the first group of basins (Group 1) and continues to initiate activities in a new group (Groups 2 through 5) each year over a five-year cycle to cover the entire state.

The general sequence of the five-year cycle is:

**Phase 1- Basin Assessment**, Preliminary basin assessment focusing on existing data.

**Phase 2 –Verified List**, Strategic water quality monitoring to obtain additional detailed scientific evidence of water quality conditions and adoption of basin-specific verified lists of impaired waters.

**Phase 3 – Total Maximum Daily Loads (TMDL)**, Data analysis and TMDL development and adoption where impairment exists.

**Phase 4 – Basin Management Action Plans (B-MAP) Development**, Development of a Basin Management Action Plan, in conjunction with local stakeholders, to allocate, among the local sources of pollution, reductions necessary to meet the TMDL.

**Phase 5 - B-MAP Implementation, Implementation of the TMDL.**

In Lower Charlotte Harbor, Everglades West Coast (including Estero Bay) is in Group 1. Charlotte Harbor (including Pine Island Sound) is in Group 2, and Caloosahatchee (both fresh and tidal portions) are in Group 3. The five year cycle of each basin is shown in Table 1.

**Table 1: Impaired Waters Basin Management Action Plan Phases and Cycle Year**

Fiscal Year	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10
Estero (Group 1)	1	2	3	4	5	1	2	3	4	5
Charlotte Harbor (Group 2)		1	2	3	4	5	1	2	3	4
Caloosahatchee (Group 3)			1	2	3	4	5	1	2	3

Within LCH, a total of 40 out of 113 waterbodies are impaired for at least one parameter. Within the 40 impaired water bodies, there are a total of 72 impairments listed by basin, below. Maps depicting impaired parameters by basin and WBID are included in the Reconnaissance Report.

Lower Charlotte Harbor Basin

Charlotte Harbor is in Group 2 and is divided into two planning units; Charlotte Harbor Proper and Pine Island. The impaired waterbodies WBID, Water Segment Name, and Parameters Identified Using the Impaired Waters Rule are presented in Table 2. TMDL Development for Charlotte Harbor is planned for 2008 for all of the parameters, except for Mercury which is planned for 2011.

**Table 2. FDEP 303(d) Lower Charlotte Harbor Basin Waterbody Status (adopted May 27, 2004)**

Wbid	Water Segment Name	Parameters Identified Using The Impaired Waters Rule
2063*	N Fork Alligator Creek	Dissolved Oxygen
2065A*	Charlotte Harbor Upper	Iron, Mercury (in fish tissue)
2065B*	Charlotte Harbor Mid	Mercury (in fish tissue)
2065C*	Charlotte Harbor Mid	Bacteria (Shellfish)/ Mercury (in fish tissue)
2065D	Charlotte Harbor Lower	Mercury (in fish tissue)
2065E	Pine Island Sound	Bacteria (Shellfish)
2065F	Matalacha Pass	Bacteria (Shellfish)
2092E	Pine Island	Bacteria (Shellfish)
2092F	Sanibel Island	Nutrients (TSI)
8999	Florida Gulf Coast	Mercury (in fish tissue)

\*SWFWMD jurisdiction

Tidal Caloosahatchee Basin

The Tidal Caloosahatchee basin is in Group 3. The basin is divided into 3 planning units; the Caloosahatchee Estuary, Telegraph Swamp, and Orange River. The impaired waterbodies by name, WBID and impairment(s) are presented in Table 3. TMDL Development is planned for 2008 for nutrients and DO. All other parameters are due 2009.

However, with Senate Bill 392, passing in Legislative Year 2007: An additional provision created in the bill, s. 373.4595(5), F.S., directs the DEP to expedite the development and implementation of TMDLs for the Caloosahatchee River and estuary. These TMDLs are to be proposed for final agency action no later than December 31, 2008. Upon the adoption of the TMDLs, the DEP shall initiate development of the basin management action plans. ...The bill extends the SFWMD's match requirements for the life of the trust fund (Save Our Everglades Trust Fund); allows funds to be distributed for implementation of the River Watershed Protection Plans including a local match requirement for Lee and Martin counties (GGAC 2007).

**Table 3. FDEP 303(d) Tidal Caloosahatchee Basin Waterbody Status (adopted June 20, 2005)**

Wbid	Water Segment Name	Parameters Identified Using The Impaired Waters Rule
3240A	Tidal Caloosahatchee	Copper, Dissolved Oxygen, Fecal Coliform, Nutrients (Chl a)
3240B	Tidal Caloosahatchee	Dissolved Oxygen , Fecal Coliform, Nutrients (Chl a)
3240C	Tidal Caloosahatchee	Dissolved Oxygen , Fecal Coliform, Nutrients (Chl a)
3240E	Yellow Fever Creek	Fecal Coliform
3240E 1	Hancock Creek	Dissolved Oxygen , Fecal Coliform, Nutrients (Chl a)
3240F	Daughtrey Creek	Fecal Coliform
3240G	Trout Creek	Conductance, Fecal Coliform
3240H	Whisky Creek (Wyoua Creek)	Fecal Coliform
3240I	Manuel Branch	Copper, Fecal Coliform, Lead
3240L	Gilchrest Drain--Powell	Dissolved Oxygen, Fecal Coliform, Nutrients (Chl a)
3240M	Stroud Creek	Fecal Coliform, Nutrients (Chl a)
3240N	Owl Creek	Fecal Coliform
3240Q	Popash Creek	Dissolved Oxygen , Fecal Coliform, Nutrients (Chl a)

### Freshwater Caloosahatchee Basin

The Freshwater Caloosahatchee basin is in Group 3 and is divided into 2 planning units; West Caloosahatchee and East Caloosahatchee. The impaired waterbodies by name, WBID and impairment(s) for the freshwater Caloosahatchee are shown in Table 4. TMDL development is planned for 2008 for nutrients and DO. All other parameters are due 2009, except for Ninemile Canal fecal coliform for which there is a draft TMDL as of September 1, 2005.

**Table 4. FDEP 303(d) Freshwater Caloosahatchee Basin Waterbody Status (adopted June 20, 2005)**

Wbid	Water Segment Name	Parameters Identified Using The Impaired Waters Rule
3237A	East Caloosahatchee	Iron
3237B	Long Hammock Creek	Dissolved Oxygen, Nutrients (Chl a)
3237C	Lake Hicpochee	Lead
3237D	Ninemile Canal	Fecal Coliform, Lead
3246	C-21	Iron
3240J	Billy Creek	Fecal Coliform
3235A	West Caloosahatchee	Iron, Lead
3235D	Jacks Branch	Nutrients (Chl a)
3235K	Townsend Canal	Copper, Lead

### Estero Bay Basin

The Estero Bay planning unit is in Group 1, as part of the Everglades West Coast group. The impaired waterbodies by name, WBID and impairment(s) are presented in Table 5. TMDL development is currently planned for 2007 for all of the parameters.

**Table 5. FDEP 303(d) Estero Bay Basin Waterbody Status (adopted March 11, 2003)**

Wbid	Water Segment Name	Parameters Identified Using The Impaired Waters Rule
3258B	Hendry Creek (Fresh)	Dissolved Oxygen, Nutrients (Chl a)
3258B1	Hendry Creek Marine	Dissolved Oxygen, Nutrients (Chl a), Fecal Coliforms
3258C	Estero Bay Drainage (Mullock Creek)	Dissolved Oxygen, Nutrients (Chl a)
3258D1	Estero River Marine	Dissolved Oxygen, Nutrients (Chl a), Copper
3258E	Imperial River (Fresh)	Dissolved Oxygen, Nutrients (Chl a)
3258E1	Imperial River (Marine)	Copper
3258H1	Spring Creek Marine	Dissolved Oxygen, Nutrients (Chl a), Copper
8065	Sw Coast Gulf 5	Bacteria (Shellfish)

## A.7. Land Acquisition

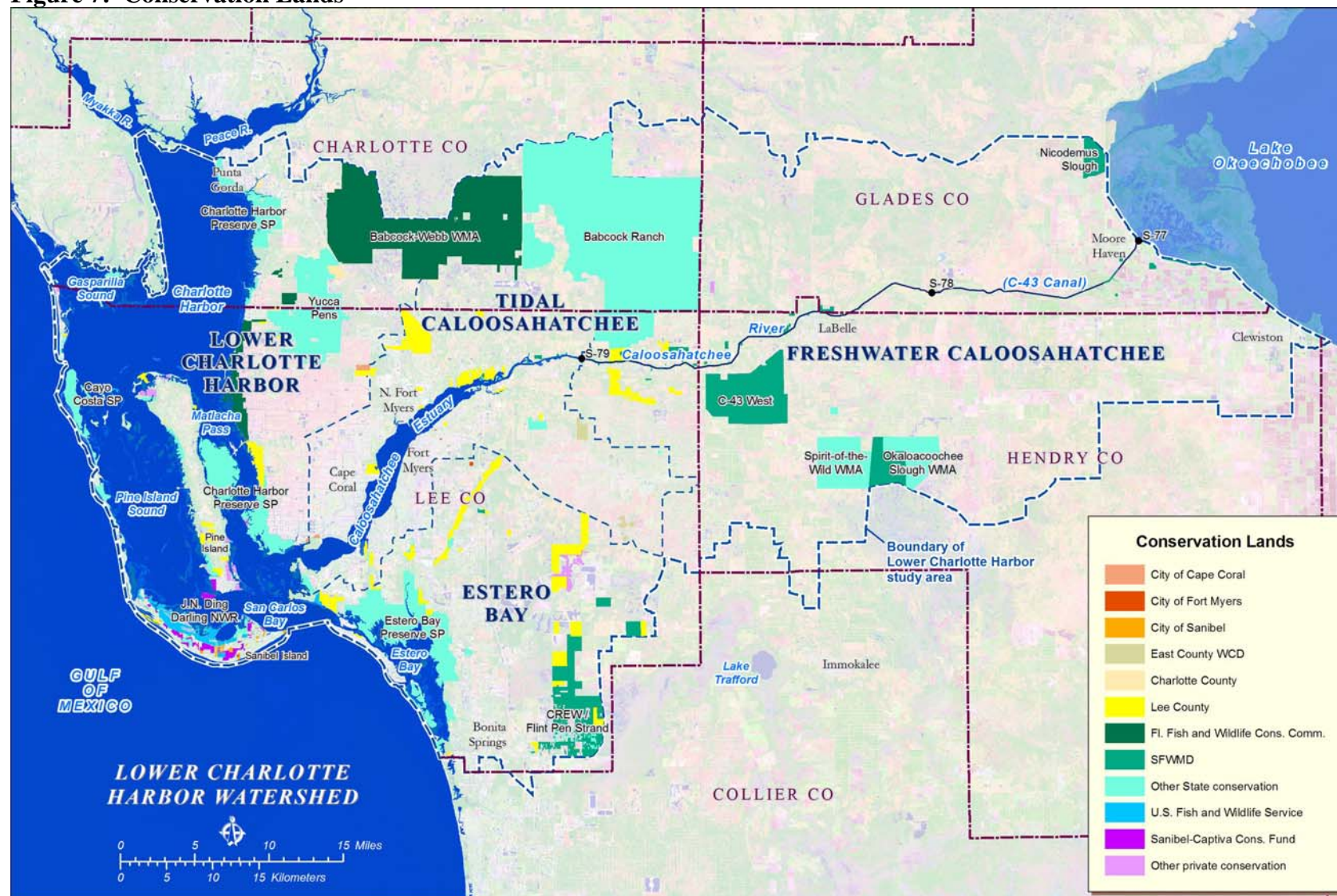
The Florida Natural Areas Inventory (FNAI) maintains an inventory and GIS coverage of lands under public and private non-profit management for conservation purposes. The coverage includes contact information and descriptions of the property. Approximately 233,000 acres, or 19% of the LCH land area, are publicly managed as shown in Table 6 and Figure 7. These acreages are approximate because new lands are continually being added to the inventory. Update estimates can be found at Florida Natural Inventory Website at <http://www.fnai.org/>.

**Table 6: Acreage in Conservation**

	<i><b>Lower Charlotte Harbor</b></i>	<i><b>Tidal Caloosahatchee</b></i>	<i><b>Freshwater Caloosahatchee</b></i>	<i><b>Estero Bay</b></i>	<i><b>Total</b></i>
<b>City and Local Government</b>					
City of Cape Coral	210	108	0	0	<b>317</b>
City of Fort Myers	0	10	0	37	<b>48</b>
City of Sanibel	392	0	0	0	<b>392</b>
East County Water Control District	0	928	20	0	<b>949</b>
<b>County Government</b>					
Charlotte County	639	0	0	0	<b>639</b>
Collier County	0	0	0	2	<b>2</b>
Lee County	2,988	5,419	2,729	8,474	<b>19,609</b>
<b>State of Florida</b>					
Fish & Wildlife Conservation Commission	24,794	19,496	26	0	<b>44,316</b>
SFWMD	0	249	20,070	9,679	<b>29,999</b>
Other State conservation lands	31,125	48,725	35,887	14,909	<b>130,647</b>
<b>Federal</b>					
Fish & Wildlife Service	2,812	33	28	148	<b>3,021</b>
<b>Private</b>					
Sanibel-Captiva Conservation Fund	1,481	0	0	0	<b>1,481</b>
Other private conservation lands	948	8	199	1,011	<b>2,167</b>
<b>Total</b>	<b>65,390</b>	<b>74,977</b>	<b>58,959</b>	<b>34,262</b>	<b>233,587</b>
Total Land Area	<b>179,669</b>	<b>246,110</b>	<b>614,833</b>	<b>178,315</b>	<b>1,218,928</b>
Percentage in Conservation	<b>36.4%</b>	<b>30.5%</b>	<b>9.6%</b>	<b>19.2%</b>	<b>19.2%</b>



**Figure 7: Conservation Lands**



An additional 10,433 acres, summarized in Table 7, are privately managed and are within a conservation easement

**Table 7: Conservation Easements**

	<i><b>Lower Charlotte Harbor</b></i>	<i><b>Tidal Caloosahatchee</b></i>	<i><b>Freshwater Caloosahatchee</b></i>	<i><b>Estero Bay</b></i>	<i><b>Total</b></i>
Federal easement (NRCS)			501		<b>501</b>
State easement (DEP)		323	3,062		<b>3,385</b>
State easement (SFWMD)	390	639	533	3,438	<b>5,001</b>
County/Local easement (LEE)	71	76		1,399	<b>1,546</b>
<b>Total</b>	<b>462</b>	<b>1,037</b>	<b>4,096</b>	<b>4,837</b>	<b>10,433</b>

## **A.8. Water Supply**

The SFWMD has published a series of documents to address agricultural and urban water supplies. The 2000 Lower West Coast Water Supply Plan (LWCWSP) covers the entire LCH area plus the Big Cypress Basin. The 2000 Caloosahatchee Water Supply Plan (CWSP) and the Caloosahatchee Water Management Plan (CWMP) provides more detailed analysis for the Caloosahatchee watershed.

The LWCWSP states the projected 2020 water demands in the LWC Planning Area can be met during a 1-in-10 year drought condition while not causing harm to the water resources and natural systems. However, this is accomplished by not relying solely on historically used sources of water. In the western portions of the LWC Planning Area, several sources, primarily the Surficial Aquifer System (SAS) and the Intermediate Aquifer System (IAS), in the urban coastal areas are not adequate to meet the growing needs of the LWC Planning Area during a 1-in-10 year drought condition due to potential impacts on wetlands and the potential for saltwater intrusion. The plan points to diversification of supply sources such as developing brackish supplies from the Floridan aquifer, increased use of reclaimed water and surface water, and Aquifer Storage and Recovery (ASR) as alternatives. “The use of reclaimed water and supplemental sources was emphasized to meet the projected irrigation demands in the urban areas, especially along the coast. Additional work is necessary to identify the most effective method to make these sources available for use at the local level, including storage.” A distribution system was discussed in the 2000 LWCWSP and is now being implemented.

The CWSP determined that the surface water availability in the C-43 Canal during a 1-in-10 year drought condition is not currently adequate “to support the projected water supply demands and environmental needs.” However, the CWSP identified that these current and future needs could be met through implementation of a combination of projects involving



basin storage including regional and distribution reservoirs and delivery of water from Lake Okeechobee. The Southwest Florida Feasibility Study would further analyze opportunities to meet future water needs in the Caloosahatchee Basin and Estuary.

### **A.9. Completed or Pending Lower Charlotte Harbor Watershed Studies**

A variety of studies and plans have been done that address water quality, hydrology, and ecosystems in the Lower Charlotte Harbor Watershed. Chapter 3 of the Reconnaissance Report provides a detailed summary of each of the listed studies, as well as a compendium of other studies and plans of interest.

### **A.10. Current Restoration or Protection Projects**

Because of the flat topography of the southern peninsula of Florida, basin boundaries are not pronounced. South Florida geomorphology, water management district boundaries, and some dredging projects that have connected water bodies, result in the need for overlapping watershed-based planning and protection. There are several plans which overlap the Lower Charlotte Harbor area yet extend beyond its boundaries. These include the Lake Okeechobee Protection Plan (LOPP), the Charlotte Harbor SWIM Plan, the Estero Bay and Watershed Assessment, Comprehensive Everglades Restoration Plan (CERP), and the Southwest Florida Feasibility Study (SWFFS). These plans are described below.

#### Lake Okeechobee Protection Plan (LOPP)

The Lake Okeechobee SWIM Plan was superseded by the LOPP which was required by the Lake Okeechobee Protection Act (Sec. 373.4595, F.S.), passed in 2000. The Act required that the SFWMD, in cooperation with FDEP and DACS, complete a Lake Okeechobee Protection Plan by January 1, 2004. The LOPP specifically addresses issues of phosphorous loading, water quality, and exotic species control. The LOPP geographically overlaps with other projects and initiatives, specifically: the Lower Charlotte Harbor SWIM area, the L-8 structure, Nicodemus Slough, and the East Beach basins. The LOPP can be found at: [http://www.sfwmd.gov/org/wrp/okee/projects/protection\\_plan.html](http://www.sfwmd.gov/org/wrp/okee/projects/protection_plan.html)

#### SWFWMD Charlotte Harbor SWIM Plan

Charlotte Harbor within the SWFWMD service area was designated a SWIM waterbody in 1990. With the establishment of the Charlotte Harbor National Estuary Program in 1996, the waterbody boundaries were expanded in 2000 to include Lemon Bay and coastal Venice watersheds. The plan includes priority projects, some of which are in the Lower Charlotte Harbor SWIM boundaries. These include water quality monitoring, Alligator Creek Restoration, development of a Pollutant Load Reduction Goal (PLRG) for Charlotte Harbor Proper, continued seagrass mapping, and Charlotte Harbor educational efforts. The SWIM Plan can be found at: <http://www.swfwmd.state.fl.us/documents/>.

#### Charlotte Harbor National Estuary Program, Comprehensive Conservation and Management Plan (CHNEP, CCMP)

The CHNEP, CCMP addresses four priority problems that are common throughout the CHNEP study area and that have been identified to impede the health of the watersheds and

estuaries. They are water quality degradation, hydrologic alterations, fish and wildlife habitat loss, and stewardship gaps. The plan includes a series of graphic vision maps, quantifiable objectives, priority actions and many support documents. Copies of both the current and draft plans can be found at <http://www.chnep.org/CCMP/CCMP.htm>.

#### Estero Bay and Watershed Assessment

The flooding events of 1995 showed that as water levels rise, the direction of water flow changes and the Estero Bay basin is enlarged to include Lake Trafford and the surrounding area. This finding as well as other pressures within the Estero Bay basin prompted the SFWMD to prepare the Estero Bay and Watershed Assessment. This assessment was prepared within the same timeframe as the South Lee County Watershed Plan; both were completed in 1999. This assessment was designed to establish a foundation for future management strategies and a framework for the future identification and evaluation of management options. The assessment, completed in 2001, is comprised of six reports presented in separate volumes, which together comprise the completed findings of the study. The Estero Bay and Watershed Assessment can be found at:  
<http://www.sfwmd.gov/org/exo/ftmyers/report-text/>

#### Comprehensive Everglades Restoration Plan (CERP)

The Comprehensive Everglades Restoration Plan (CERP) provides a framework and guide to restore, protect and preserve the water resources of central and southern Florida, including the Everglades. It covers 16 counties over an 18,000-square-mile area and centers on an update of the Central & Southern Florida (C&SF) Project also known as the Restudy. Details of the Plan can be found at <http://www.evergladesplan.org/>.

A recent component of CERP is the Acceler8 initiative, an expedited course of action for achieving Everglades restoration benefits ahead of schedule and under budget. It consists of eight projects (some with multiple components) that, when completed, will provide immediate environmental, flood control and water supply benefits -- serving as the initial foundation for other comprehensive restoration efforts to follow. One of the eight projects is the C-43 West Basin Storage Reservoir Project, associated with the Caloosahatchee River. the purpose of the project is to improve the timing and quantity of freshwater flows to the Caloosahatchee River Estuary.

#### The Southwest Florida Feasibility Study (SWFFS)

The Southwest Florida Feasibility Study (SWFFS) is another component of the Comprehensive Everglades Restoration Plan (CERP) that affects all of Southwest Florida. The SWFFS was initiated to address additional water resource issues (needs, problems, and opportunities) within Southwest Florida, including the LCH, that were not being addressed directly by CERP. The study scope includes utilizing the Watershed Management Model (WMM) (CDM, 1992) to estimate pollutant loads. This modeling for the Freshwater and Tidal Caloosahatchee basins and the Estero Basin was completed by SFWMD in 2006. The output of the WMM is a spreadsheet of estimated loads that will include the LCH tributaries in addition to other Southwest Florida basins. Based on the evaluations, the WMM final report concludes that a combination of the following BMPs and actions will be necessary to manage and improve water quality in the Estero Bay-Caloosahatchee River Watershed.

- Enhanced stormwater criteria and low impact development (LID) practices, including:
  - higher efficiency BMPs,
  - retention where practicable,
  - increased stormwater recycling, and
  - LID practices such as reduced directly connected (also called “effective”) imperviousness,
- Retrofit BMP projects and strategies.

The SWFFS will evaluate the benefits of various opportunities for restoration in the LCH, such as the removal of spoil berms to improve water exchange with mangroves and the construction of filter marshes to treat high stormwater flows.

#### Northern Everglades Legislation

The Northern Everglades legislation provides a dedicated state funding source for the Northern Everglades restoration that includes the Lake Okeechobee Watershed Protection Plan and River Watershed Protection Plans for the Caloosahatchee and St. Lucie. The legislation also extends the state's commitment to provide funding for CERP and the Northern Everglades through the year 2020.

The legislation includes development of a technical plan to identify the storage and water quality treatment requirements for the Lake Okeechobee watershed by February 1, 2008. The development of the Caloosahatchee and St. Lucie Rivers Watershed Protection Plans to identify watershed storage projects and water quality targets is due for completion by January 1, 2009. Implementation of LCH SWIM Plan action steps may play a role in meeting this January 1, 2009 target date. Finally, the river protection plans will include goals for salinity envelopes and freshwater inflow targets for each estuary

#### Local Government

Local governments have numerous stormwater or surface water restoration projects that are currently being implemented or are planned for implementation in the LCH, listed in Appendix IV. Beginning with the 2005 Florida legislative session, the Community Budget Issue Request (CBIR) program mandated that local governments seeking legislative funding assistance for projects must have been reviewed by DEP under its statutory authority in Section 403.885, F.S. During the 2006 legislative session, the legislature substantially amended this section.. The revisions, which were made in section 73 of SB-888, now chapter 2006-230, Laws of Florida, remove most of the qualifying criteria formerly in the law. In addition to previous guidance, all water projects must protect public health and the environment; and implement a state, local or regional plan related to water quality protection.

Some of these projects are being funded under the District's Lower Charlotte Harbor, Caloosahatchee and Estero Bay Initiatives. Under these initiatives, cost share partners identify and jointly prioritize projects for funding. Funding is then sought from the Florida legislature by the District to further advance Lower Charlotte Harbor water quality projects' implementation.

## SECTION B. LAND USES AND REGULATED ACTIVITIES WITHIN THE LCH

### B.1. Land Use and Land Cover

#### 2000 Land Use

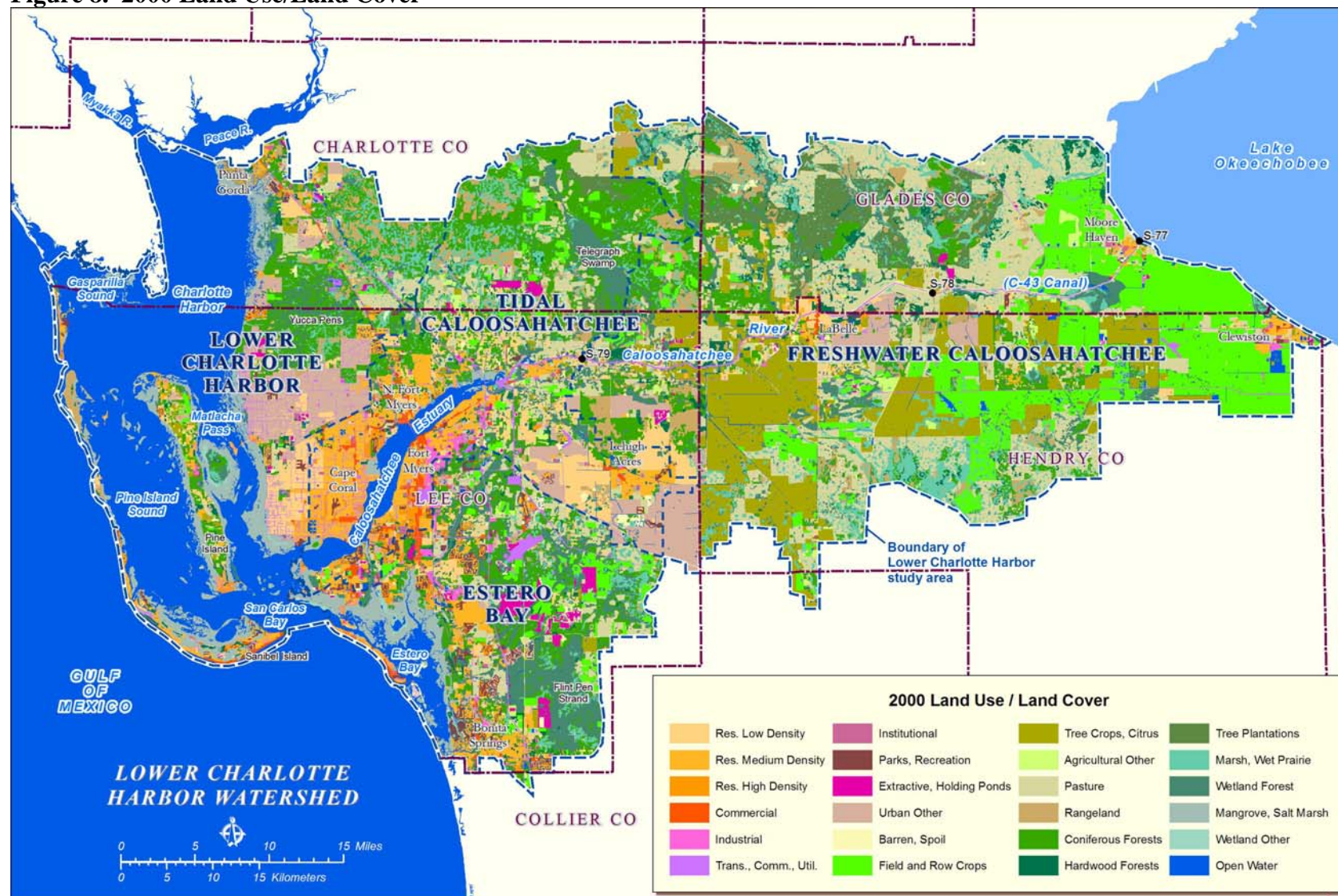
Large-scale agricultural operations, including sugar cane and citrus, are located in the Freshwater Caloosahatchee basin, and the landscape there remains mostly rural. Upland forests are found predominately north of the Caloosahatchee River in Charlotte and Glades Counties. Wetlands are found as a mangrove fringe surrounding the estuarine waters and as large cypress systems such as the Flint Pen Strand, Yucca Pens, and Telegraph Swamp. Acreages of major land-use categories for the basins of the study area are shown in Table 8.

**Table 8. 2000 Land Use, grouped by basin and major land-use category**

<b>BASIN</b> <i>Area, in acres</i>	<b>Urban and Built-Up Land</b>	<b>Agriculture, including Pasture</b>	<b>Range and Upland Forest</b>	<b>Wetlands</b>	<b>Open Water</b>	<b>Total</b>
Lower Charlotte Harbor	64,502	11,215	51,066	57,014	176,759	<b>360,556</b>
Tidal Caloosahatchee	95,805	34,690	74,203	40,107	17,868	<b>262,672</b>
Freshwater Caloosahatchee	52,317	335,291	127,343	94,600	5,306	<b>614,856</b>
Estero Bay	52,365	31,004	36,013	56,256	15,430	<b>191,067</b>
<b>Total Study Area</b>	<b>264,988</b>	<b>412,200</b>	<b>288,625</b>	<b>247,976</b>	<b>215,362</b>	<b>1,429,151</b>
<i>Percentage</i>						
Lower Charlotte Harbor	17.9%	3.1%	14.2%	15.8%	49.0%	<b>25.2%</b>
Tidal Caloosahatchee	36.5%	13.2%	28.2%	15.3%	6.8%	<b>18.4%</b>
Freshwater Caloosahatchee	8.5%	54.5%	20.7%	15.4%	0.9%	<b>43.0%</b>
Estero Bay	27.4%	16.2%	18.8%	29.4%	8.1%	<b>13.4%</b>
<b>Total Study Area</b>	<b>18.5%</b>	<b>28.8%</b>	<b>20.2%</b>	<b>17.4%</b>	<b>15.1%</b>	<b>100.0%</b>

The SFWMD and SWFWMD have mapped land use for 2000 according to the Florida Land Use and Cover Classification System (Figure 8). The coastal urban areas of Lee County (Ft. Myers, Cape Coral, Estero, and Bonita Springs) are experiencing rapid growth. Cape Coral and Lehigh Acres, which were platted several decades ago by land speculators, have filled in significantly during the last decade.

Figure 8. 2000 Land Use/Land Cover



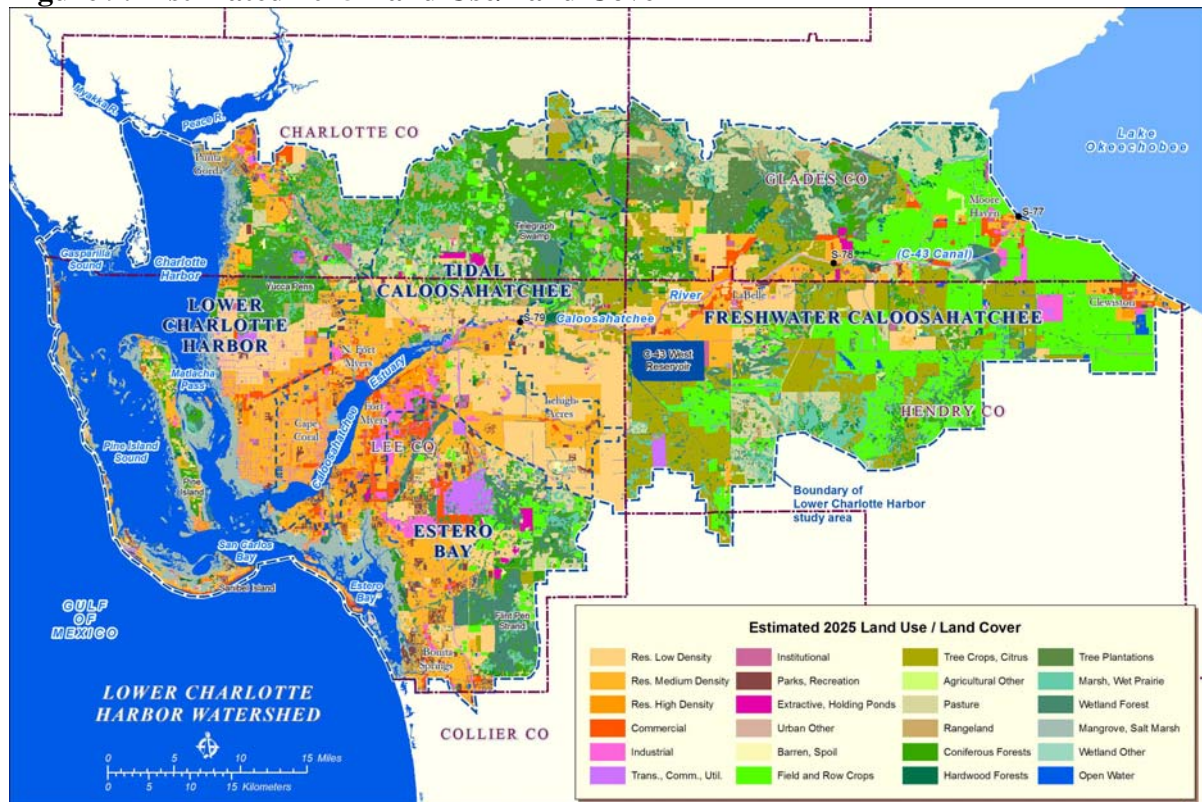


### Estimated 2025 Land Use

The SFWMD has estimated likely changes in land use for 2025 based on county growth plans, water permits, agricultural forecasts, and local expert knowledge. The primary change is expected to be continued urban expansion and infill, especially in Lee County (Figure 9). The LaBelle corridor along State Road 80 and the Caloosahatchee River in northern Hendry and southern Glades Counties also is expected to experience widespread urban growth. The urban area within the LCH is expected to expand by more than 60% by 2025 (Table 9).

Agricultural operations such as sugar cane, citrus, vegetables, and sod may migrate into areas that are currently pastureland, but the total agricultural acreage probably will decline as farmlands are sold off for urban development. Rangeland and upland forest lands will be reduced by about one quarter, and approximately 10% of existing wetlands are predicted to be lost to urban encroachment.

**Figure 9. Estimated 2025 Land Use/Land Cover**



**Table 9. Estimated 2025 Land Use, grouped by basin and major land-use category**

<b>BASIN</b> <b>Area, in acres</b>	<b>Urban and Built-Up Land</b>	<b>Agriculture, including Pasture</b>	<b>Range and Upland Forest</b>	<b>Wetlands</b>	<b>Open Water</b>	<b>Total</b>
Lower Charlotte Harbor	78,344	9,255	41,814	54,384	176,759	<b>360,556</b>
Tidal Caloosahatchee	129,719	23,864	58,583	32,638	17,868	<b>262,672</b>
Freshwater Caloosahatchee	127,333	290,958	96,099	84,343	16,122 <sup>1</sup>	<b>614,856</b>
Estero Bay	94,507	17,422	15,700	48,008	15,430	<b>191,067</b>
<b>Total Study Area</b>	<b>429,902</b>	<b>341,500</b>	<b>212,196</b>	<b>219,373</b>	<b>226,179</b>	<b>1,429,151</b>
<b>Percentage</b>						
Lower Charlotte Harbor	21.7%	2.6%	11.6%	15.1%	49.0%	<b>25.2%</b>
Tidal Caloosahatchee	49.4%	9.1%	22.3%	12.4%	6.8%	<b>18.4%</b>
Freshwater Caloosahatchee	20.7%	47.3%	15.6%	13.7%	2.6%	<b>43.0%</b>
Estero Bay	49.5%	9.1%	8.2%	25.1%	8.1%	<b>13.4%</b>
<b>Total Study Area</b>	<b>30.1%</b>	<b>23.9%</b>	<b>14.8%</b>	<b>15.3%</b>	<b>15.8%</b>	<b>100.0%</b>
<b>Percentage change from 2000 to 2025</b>						
Lower Charlotte Harbor	21.5%	-17.5%	-18.1%	-4.6%	0.0%	
Tidal Caloosahatchee	35.4%	-31.2%	-21.1%	-18.6%	0.0%	
Freshwater Caloosahatchee	143.4%	-13.2%	-24.5%	-10.8%	203.9%	
Estero Bay	80.5%	-43.8%	-56.4%	-14.7%	0.0%	
<b>Total Study Area</b>	<b>62.2%</b>	<b>-17.2%</b>	<b>-26.5%</b>	<b>-11.5%</b>	<b>5.0%</b>	

<sup>1</sup> The large increase in open-water area in the Freshwater Caloosahatchee will result from construction of the C-43 West Reservoir, downstream from LaBelle.

## B.2. Point Sources of Pollution

In October 2000, the U.S. Environmental Protection Agency (EPA) authorized FDEP to implement the National Pollutant Discharge Elimination System (NPDES) stormwater permitting program in the State of Florida (with the exception of Tribal lands). The program regulates point source discharges of stormwater runoff from urban as well as certain industrial facilities. The operators of regulated industrial facilities must obtain an NPDES stormwater permit and implement appropriate pollution prevention techniques to reduce contamination of stormwater runoff.

There are a number of domestic and industrial wastewater facilities in the LCH basin with NPDES permits to discharge to surface waters. The volume of discharges to surface waters from these facilities compared to their permitted capacities varies, with some facilities discharging to surface water only during wet weather conditions and others discharging to surface waters exclusively. A list of these facilities is given in Appendix II.

The State of Florida also issues the Multi-Sector Generic Permit (MSGP) for Stormwater Discharge Associated with Industrial Activity. Most regulated facilities in the state are

eligible for coverage under the MSGP. MSGP permittees in the LCH basin are listed in Appendix III.

Maps depicting point source pollution are included in the Reconnaissance Report.

Municipal Separate Storm Sewer Systems (MS4)

Designated large and medium municipal separate storm sewer systems, or MS4s, are a publicly-owned conveyance or system of conveyances (i.e., ditches, curbs, catch basins, underground pipes) that are designed for the discharge of stormwater to surface waters of the state. An MS4 can drain, and be operated by, municipalities, counties, drainage districts, colleges, military bases, or prisons, to name a few examples. These facilities were previously required by EPA to obtain NPDES permits prior to delegation to the state. In the state of Florida, Phase II permitting was completed in 2003, and the permitted program should be implemented by 2008. DEP's authority to administer the NPDES program is set forth in [Section 403.0885, Florida Statutes \(F.S.\)](#).

- Lee County  
Lee County received an NPDES permit for its MS4 in October 1997. The permit conditionally authorizes Lee County and the 13 original co-permittees to discharge stormwater to “the Waters of the United States.” Agreements signed between all co-permittees assure cooperation in boundary related issues. Additionally, the County is required to inspect and monitor industrial and construction activities for permit compliance. Lee County [Ordinance 98-11](#) was adopted in June, 1998 providing legal authority for enforcement of the CWA mandate.

Under the NPDES General Permit for Storm Water Discharges Associated with Industrial and Construction Activities, EPA requires the development and implementation of a Storm Water Pollution Prevention Plan (SWP3) designed to reduce pollution at the source. A notice of intent has been issued with Lee County’s SWP3 for all construction work greater than 1 acre per Lee County Development Code 14-477.

Cities within Lee County are co-permittees for the NPDES program. Lee County maintains NPDES information online at: <http://www.lee-county.com/npdes/>.

- Charlotte County  
On June 1, 2003, Charlotte County submitted an application to obtain an NPDES permit. The City of Punta Gorda is a co-permittee with Charlotte County for the NPDES program. Charlotte County maintains an NPDES site at: <http://www.charlottecountyfl.com/publicworks/stormwater.htm>.
- Hendry and Glades Counties  
Hendry and Glades Counties and their cities are not required to obtain NPDES permits.



### B.3. Nonpoint Sources of Pollution

Non-point sources of pollution in the Watershed, which can degrade ground as well as surface water quality, include stormwater runoff or leaching of pollutants into groundwater from agriculture, and urban/suburban land uses, atmospheric deposition, and septic tanks. Septic tanks, or Onsite Sewage Treatment and Disposal Systems (OSTDS) are prevalent in some areas of the Watershed and are considered a potential source of nutrients (nitrogen and phosphorus), pathogens and other pollutants that can pose a threat to public health. Surface waters can be adversely affected directly by system drainfields washed away by floodwaters or via runoff from areas where system failures result in ponding of untreated or inadequately treated wastewater on the ground. Surface waters can be adversely affected indirectly through seepage of groundwaters contaminated by system discharges. From the period 2000-2005 the Florida Department of Health reported 2050 OSTDS repair permits for Charlotte, Glades, Hendry and Lee counties (Table 10) and 20,571 new installation permits (Table 11).

**Table 10. Septic Tank Repairs for the period 2000-2005**

COUNTY	2000-01	2001-02	2002-03	2003-04	2004-05	All Years
Charlotte	129	135	144	70	55	533
Glades	35	23	12	10	10	90
Hendry	30	29	34	27	26	146
Lee	319	368	253	219	122	1,281
TOTAL	513	555	443	326	213	2,050

Source: (<http://www.doh.state.fl.us/environment/ostds/statistics/repairs.htm>)

**Table 11. New Septic Tank Installations for the period 2000-2005**

COUNTY	2000-01	2001-02	2002-03	2003-04	2004-05	All Years
Charlotte	325	315	365	405	406	1,816
Glades	95	59	66	45	46	311
Hendry	122	135	160	183	158	758
Lee	2,220	2,254	3,149	4,180	5,883	17,686
TOTAL	2,762	2,763	3,740	4,813	6,493	20,571

Source: (<http://www.doh.state.fl.us/environment/ostds/statistics/NewInstallations.htm>).

### B.4. SFWMD Regulated Activities

#### Environmental Resource Permits

The South Florida Water Management District (SFWMD) protects the supply and the quality of water resources by regulating the management and storage of surface waters and the dredging or filling of wetlands with Environmental Resource Permits (ERP). An ERP covers activities such as dredging and filling in wetlands, constructing flood protection facilities, providing stormwater containment and treatment, site grading, building dams or reservoirs, and other activities affecting state waters. The ERP combines wetland resources permitting with management and storage of surface waters permitting into a single permit, to streamline the permitting process. An ERP must be obtained before beginning any activity that could affect wetlands, alter surface water flows, or contribute to water pollution.

Minimum Flows and Levels (MFLs)

Florida law requires the water management districts to establish MFLs for surface waters and aquifers within their jurisdiction (section 373.042(1), F.S.) The minimum flow is defined as the "...limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area". The minimum level is defined as the "limit at which further withdrawals would be significantly harmful to the water resources of the area" (section 373.042(1), F.S.). The statute further directs water management districts to use the best available information in establishing the MFL level.

A Minimum Flow and Level for the Caloosahatchee River and Estuary was established in September 2001 and was reviewed in 2002. In addition, SFWMD is in the process of developing a separate MFL for Estero Bay.

## **SECTION C. GOALS, INITIATIVES, & STRATEGIES FOR RESTORATION OR PROTECTION**

The Water Resource Implementation Rule (Ch 62-40, F.A.C.) calls for Water Management Districts to implement protection measures as appropriate to enhance or preserve surface water resources.

Specifically, 62-40.425 *F.A.C.* Watershed Management states:

- (1) A comprehensive watershed approach provides an important tool for managing the cumulative impacts of human activities. Where possible, the Department and Districts shall promote a watershed management approach for addressing water quality, water supply, natural systems, and floodplain management and flood protection issues, and shall encourage the development of comprehensive watershed management plans.
- (2) It shall be a goal of watershed management programs to protect, preserve and restore the quality, quantity, and environmental values of surface and ground water resources; to prevent existing environmental, water quantity, and water quality problems from becoming worse; to reduce existing flooding problems; improve existing water quality; promote and protect the availability of sufficient water for all existing and future reasonable-beneficial uses and natural systems, and preserve or restore natural systems.
- (3) As part of SWIM plans or other watershed management plans, programs, or rules, the Department, water management districts, Department of Agriculture and Consumer Services, and local governments are encouraged to implement protection measures as appropriate to enhance or preserve surface water resources. Protection measures shall be based on scientific evaluations of targeted surface waters and the need for enhancement or preservation of these surface water resources. Protection measures shall include a combination of nonstructural pollution prevention best management practices and structural best management practices.

Specific Authority 373.026(7), 373.036(1)(d), 373.043, 373.171 FS. Law Implemented 373.023, 373.026, 373.036(1)(d), 373.171, 373.1961, 373.223, 373.418, 373.451, 373.453, 403.064, 403.067, 403.0891 FS. History—New 5-7-05.

Water management goals and objectives of the Lower Charlotte Harbor SWIM plan include the following:

- Protect and improve surface water quality
- Preserve and restore, where appropriate, native ecosystems along with their water resource related functions
- Maintain the integrity and functions of water resources and related natural systems
- Improve degraded water resources and related natural systems to a more natural functionality

The mission of the LCH Plan is thus to preserve and protect the freshwater and estuarine ecosystems in the Lower Charlotte Harbor Watershed and the contributing drainage area

consistent with the goals of the South Florida Water Management District. The mission will be accomplished through the use of a prioritized, objective, sustainable, ecosystem or watershed approach with periodic public review and input. Through prioritization, projects will be chosen which are most likely to result in protection and/or restoration. Sustainable restoration and enhancement techniques alone or in combination will minimize the public's financial and material liability toward the management and operation of these systems. An ecosystem-watershed approach will take into consideration the cause and effects of the problem within its land-based, freshwater and estuarine context and establish successful applications for enhancement or restoration.

The Lower Charlotte Harbor SWIM plan is organized around a system of goals, initiatives, strategies and action steps. In this system, the *Goals* are broad-based and identify objectives of SFWMD, stated above. *Initiatives* are general categories that have been used to divide the plan into distinct subject areas developed by SFWMD staff. *Strategies* are more detailed descriptions of the underlying work proposed to achieve results. They identify the approaches and methods that will be used to implement the initiatives. *Action Steps* represent specific activities under each strategy suggested to reach project delivery. Each *Action Step* has an associated estimate of the funding requirements and schedule for completion. These *Action Steps*, as well as the *Strategies* and *Initiatives* referenced above, are not mutually exclusive, and may be undertaken concurrently or sequentially.

The consensus of the Lower Charlotte Harbor SWIM Plan Team is that the plan should focus on the following six primary initiatives:

**Initiative 1 – Water Quality**

This initiative consists of several distinct but interrelated strategies: the utilization of water quality monitoring data to evaluate sources of pollutants, the application of water quality models to evaluate the fate of water quality constituents, and the implementation of prioritized water quality enhancements for both 303(d) listed surface waters and other degraded waters.

**Initiative 2 – Stormwater Quantity**

The expanded drainage area in the LCH, reduction of sheet flow and the periodic discharge of large quantities of fresh stormwater runoff into the major river systems in the LCH results in ecologically damaging changes in salinity throughout the estuarine areas of the watershed. This initiative focuses on mechanisms to reduce these excess flows and restore more natural timing and quantity of freshwater inflows to the watershed.

**Initiative 3 – Watershed Master Planning and Implementation**

Watershed master planning is an evaluation of stormwater management in the geographic area and identification of problem areas, with detailed remedial actions generally derived using hydrologic models simulating water volumes and flows under a range of climatic conditions.

Implementation is the practical application of the information gained from master planning. For SFWMD, implementation includes assisting local governments in coordinating their plan implementation and construction (implementation) of those projects through a prioritized stormwater retrofit program. The dual focus is on areas built prior to adoption of stormwater management regulations (1984), and areas with identified impaired waters. A key tool for implementation is solicitation of available federal and state funding and identification of other partnering opportunities.

#### Initiative 4 – Habitat Assessment, Protection and Restoration

This initiative consists of strategies to evaluate ancillary data needed to identify and provide habitat protection and restoration in the LCH. Additional data collection efforts for parameters such as benthic organism diversity, submerged aquatic vegetation distribution, and shellfish areas will be evaluated and implemented as necessary.

Through the results of data collection and analysis, opportunities for habitat restoration will be evaluated and potentially scheduled for implementation in the LCH.

#### Initiative 5 – Outreach

The LCH watershed encompasses a diverse region of urban, agricultural and environmental lands, and it is managed and regulated by numerous agencies and municipalities. Outreach, including both communication and coordination, is vital tool for SFWMD to efficiently and effectively meet the differing needs of these entities, while also meeting LCH SWIM goals. Through outreach, SFWMD can provide leadership with both the public and local governments.

#### Initiative 6 – Funding

Funding is an issue that occurs across all of the other initiatives. It is listed as a distinct initiative to highlight and acknowledge the need for long-term dedicated funding to reach plan goals. It also serves to coordinate funding within and across district areas of responsibility, as well as within each of the other initiatives in the LCH SWIM Plan.

In its mandate to address broad ecosystem needs, the Lower Charlotte Harbor SWIM Plan attempts to accomplish comprehensive protection strategies within the LCH and introduce sustainable restoration strategies for resources or resource areas that are proven to be degraded. The intent is to also provide cooperative funding for projects addressing long-term waterbody protection and restoration.

In some aspects, the ecology and geography of one or more of the four basins comprising the LCH Watershed may be unique. As such, remedial measures may not be appropriate or necessary for all of the basins. In the following discussion of restoration or protection strategies, if a strategy or action step is not applicable to all basins then those for which a

strategy or action step does apply will be identified in parentheses at the end of the respective strategy or action step.

## **C.1. Water Quality Initiative**

### **C.1.1. Strategy: Utilize the Existing Water Quality Monitoring Network to Assess the Origin and Fate of Pollutants**

Section A.6 describes the water quality data that are collected by numerous agencies and volunteer organizations within the LCH basin. The existing water quality monitoring programs consist of ambient monitoring to generally characterize water quality in the LCH and identify water quality problems and trends.

The purpose of this strategy is to evaluate that data, revise monitoring as necessary, then utilize the data to develop meaningful guideposts and implement water quality improvements focused on priority impaired waters. Underlying questions to be considered within this strategy include:

- Are the standard TMDL criteria sufficient for local natural resources, i.e., do the criteria adequately consider potentially unique local background conditions?
- Are land use changes from natural areas to agriculture to urban affecting water quality?

#### **C.1.1.1. Action Steps:**

1. The initial action step conducted under this strategy is to evaluate whether the existing water quality data for the Lower Charlotte Harbor is sufficient to complete the other action steps within this strategy.
2. Upon completion of the data sufficiency review, identify pollutant sources in both freshwater and tidal basins and assess removal efficiencies.
  - a. A sub-task within this assessment is to consider groundwater discharge and nutrient loading into both the estuaries and near-shore environment.
3. Investigate nonpoint residential discharges and nutrient input (fertilizer).
4. Identify short-term enhancement goals focusing on previously identified water quality “hot spots”.

All of these action steps will be completed in coordination with both FDEP on priority impaired waters, and collaboratively with programs such as CERP and local government initiatives. The intent is to avoid redundant restoration efforts.

### **C.1.2. Strategy: Hydrologic and Hydrodynamic Water Quality Modeling**

A number of regional hydrologic and hydraulic studies and models have already been developed, including four hydrologic and hydraulic models used to support decision-making



through the Southwest Florida Feasibility Study. They include the SWFFS Regional Model, MIKE SHE, MIKE 11, and CH3D (Hydrodynamic Model). The 2003 Strategic Model Plan lists these models as a part of an overall model strategy for SFWMD. The plan can be viewed at: [http://gwmftp.jacobs.com/Peer\\_Review/strategic\\_plan\\_final\\_2%200.pdf](http://gwmftp.jacobs.com/Peer_Review/strategic_plan_final_2%200.pdf). An additional model that needs to be considered is an estuarine mixing model to address the LCH watershed. Model development and testing should be carefully scheduled with long-term and short-term data collection, so that all of the necessary data are available when needed for the models.

Finally, hydrologic model development, environmental model development, water quality analyses, and water supply analyses are required to refine alternative plan formulation. Cost-effectiveness and incremental cost analysis will be used to compare different outputs resulting from the various levels of expenditures.

#### **C.1.2.1. Action Steps:**

1. Evaluate existing data sets and acquire the necessary comprehensive data sets and any new data from continuous collection stations throughout the watershed for model development and testing.
  - With so many model possibilities, an important aspect of this action step is to establish protocols for data coordination and control within SFWMD. This is accomplished as an ongoing activity through an interdepartmental model development workgroup.
2. Investigate the fate of water quality constituents in the watershed via the appropriate water quality model.
  - Include an alternatives analysis of potential management practices and projects to support the objective of reducing nutrient and sediment loadings and implementing cost-effective BMPs. Areas of good to excellent water quality may also be identified and may be recommended for conservation purposes.
3. Coordinate model activities with FDEP and CERP.

#### **C.1.3. Strategy: Enhancement and Maintenance of Surface Waters**

Through water quality model evaluation, and water quality monitoring many areas in the LCH will be identified that merit restoration, protection and/or enhancement. Some areas have been designated as impaired by the FDEP, with possible TMDL allocations to be created. Still others are perceived to be impaired, but are not “listed” by FDEP. By identifying “at risk” areas of the LCH, enhancements will be encouraged and projects will be proposed to avoid the application of the TMDL process to these areas. Through this proactive approach new concepts such as low impact development (LID) and Sustainability, and Water Quality Banking will be considered.

Maintenance of drainage canals and tributaries in the LCH is generally focused more on flood protection than on water quality. Awareness of BMPs and carefully regulated

maintenance schedules and procedures are simple means for municipalities to reduce sediment and solids transport, and minimize water quality impacts to receiving water bodies.

#### **C.1.3.1. Action Steps:**

1. Develop adaptive management projects, using state-of-the-knowledge approaches to create interventions, enhancements and restoration projects.

If an “at risk” waterbody is identified, then SFWMD will coordinate with appropriate agencies to develop and implement BMPs for that waterbody.

2. Assess low impact development and sustainability practices, and water quality banking as enhancement tools.
3. Facilitate development of a BMP manual or guidelines for regional drainage network maintenance programs. Drainage network maintenance documents will focus on resolving downstream impacts to water quality and reducing sediment loading.
4. Encourage the maintenance of drainage conveyances consistent with BMPs that maximize water quality benefits to receiving waters. This will be accomplished through technical assistance and cost-sharing with appropriate entities.

## **C.2. Stormwater Quantity Initiative**

### **C.2.1. Strategy: Improve the timing of freshwater flows into Lower Charlotte Harbor**

The excessive amount of stormwater entering Lower Charlotte Harbor Watershed from the Caloosahatchee has a detrimental effect on both the ecology and water quality of Lower Charlotte Harbor. Extreme fluctuations from high flows to low flows cause concomitant changes in salinity that have an adverse effect on the estuarine ecosystem. There is also a perceived need for more water storage in urban and agricultural areas to improve the timing of freshwater flows. Restoring the more natural timing and quantity of releases of freshwater would help reduce the adverse impacts of current practices.

The ecologically supportive transport of runoff must also take into account the reason for much of the drainage -- flood protection. Flooding in areas like North Lee County needs to be addressed when evaluating the movement of stormwater. In addition, overdrainage of some areas has resulted in a loss of historic flow patterns.

#### **C.2.1.1. Action Steps:**

1. Investigate mechanisms for improving stormwater storage, reducing overdrainage, and capturing and re-routing excess flows to other outlets. Identify data needs to accomplish the step.

- a. Consider distributing point discharges through the use of spreader swales and converting single discharges to multiple points (each with smaller discharge volumes).
2. Investigate the impact of the revised Lake Okeechobee operating schedule on estuary pulses and salinity (Tidal and Freshwater Caloosahatchee).
3. Assess the effects of watershed loss and channelization in each basin.
4. Consider rulemaking efforts to increase onsite retention of stormwater.

### **C.2.2. Strategy: Regulatory Assessment**

There may be opportunities for water quality improvement through modification of local and regional regulations affecting the watershed. In some cases, minor regulatory changes may provide multiple benefits in addition to water quality improvement. For example, the Community Rating System (CRS), a part of the National Flood Insurance Program, is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Many of those activities have associated water quality benefits. The identified bonus to the program though, is that homeowners receive up to 45% discounts on flood insurance within those communities that participate. There is thus a need to review those regulations to identify such opportunities.

#### **C.2.2.1. Action Steps:**

1. Evaluate local government development and stormwater regulations for opportunities to provide water quality improvement.

### **C.3. Watershed Master Planning and Implementation Initiative**

There is a general lack of storage and pretreatment of stormwater throughout the LCH. Many of the urbanized areas were developed prior to the existence of stormwater management system regulations. The local stormwater master plans are in various states of currency and some areas do not have a stormwater master plan to address current development.

Regarding stormwater master plan implementation, there is an ongoing need to retrofit neighborhoods developed prior to 1984 with stormwater management systems. Many older neighborhoods in the watershed have essentially no stormwater management systems. This results in storm event flooding and water quality degradation as stormwater moves into the system through uncontrolled stormwater outlet discharges. For those areas that do have some form of treatment, infrastructure such as catch basins and piping has been sparsely mapped. A comprehensive inventory and map of catch basins and piping is needed.

Finally, stormwater master plans need an additional focal point for pursuing all goals. Watersheds need their own water budget, with a historical (or a recreated hypothetical historical) water budget, the current water budget, and the degree to which the historical

budget can be pursued for storage, without increasing flood threat for current areas in use. Such master plans should also identify any restoration remedies that could be pursued to improve storage and water quality by purchasing areas in the critical physical path of water supply and quality improvements.

### **C.3.1. Strategy: Evaluate existing watershed master plans**

Stormwater master planning is primarily a local government responsibility. Stormwater master planning has been performed for many areas of the watershed, but the plans are in various states of currency and may need to be updated or expanded to address the entire Plan Area. The impact of the area's recent rapid growth on the master plans needs to be assessed.

A more recent critical element for master plans to address is the comprehensive watershed plan elements per the EPA Guidance for 319(h) funding assistance to enable local governments to efficiently pursue this federal funding source. The elements are:

- a. An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in this watershed-based plan.
- b. An estimate of the load reductions expected for the management measures described under paragraph (c) below.
- c. A description of the nonpoint source (NPS) management measures that will need to be implemented to achieve the load reductions estimated under paragraph (b) above and an identification (using a map or a description) of the critical areas in which those measures will be needed to implement this plan.
- d. An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement this plan.
- e. An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the NPS management measures that will be implemented.
- f. A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious.
- g. A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented.
- h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards and, if not, the criteria for determining whether this watershed-based plan needs to be revised or, if a NPS TMDL has been established, whether the NPS TMDL needs to be revised.

- i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (h) immediately above.

#### **C.3.1.1. Action Steps:**

1. Examine coverage of stormwater plans. A comprehensive listing of completed and pending watershed master plans will be prepared, along with the status of completion or implementation of each study. Identify capital improvement plans and existing stormwater network maintenance programs.
2. Evaluate existing stormwater plans for flood abatement, water quality improvement, and regional adequacy.

#### **C.3.2. Strategy: Assist in the development and endorsement of local master stormwater plans and implementation schedules**

Local plans will serve as the implementation schedule for retrofit and maintenance initiatives. District models may be used to assess and predict the effects of proposed management strategies.

#### **C.3.2.1. Action Step:**

1. SFWMD will assist local governments in the development or updating of master plans that will address water quality improvements. This assistance may include activities such as facilitation, planning, cost-sharing, and technical design or review.
  - a. Review comprehensive stormwater master planning for Glades and Hendry counties. For South Lee County, revisit the Estero Watershed Study.
  - b. As part of this process, SFWMD will encourage local governments to review and incorporate retrofitting as well as the expansion of city sewers and the elimination of septic tanks guidelines into their land development requirements.
  - c. SFWMD may provide technical review of proposed master plans utilizing the following criteria per EPA guidelines as listed on the DEP website.  
<http://www.dep.state.fl.us/water/nonpoint/docs/319h/9-elements-of-watershed-plan.pdf>.

The major evaluation criteria are:

1. Identification of Causes & Sources of Impairment
2. Expected Load Reductions
3. Proposed Management Measures
4. Technical and Financial Assistance Needs
5. Information, Education, and Public Participation Component
- 6/7. Schedule and Milestones
8. Load Reduction Evaluation Criteria
9. Monitoring Component



In regards to the above elements, the LCH SWIM Plan substantially incorporates the above nine elements for a comprehensive watershed plan as defined by EPA. The missing elements for projects identified in Appendix IV of this plan are associated with #2 and 6/7 above. These critical elements for the listed projects (Appendix IV) and other projects in the LCH area must be addressed. Load reduction estimates and proposed timelines for completion of each project must be included in each local stormwater master plan or other local planning documents, then it can be stated that the combination of the LCH SWIM Plan and local plans constitute a “watershed plan” and projects identified should be eligible and considered for incremental funding through the federal Section 319 grant funding program.

2. Coordinate with local government land acquisition plans for stormwater retrofit opportunities that encourage recharge and re-use of stormwater runoff, where appropriate.

### **C.3.3. Strategy: Partner with local governments to implement stormwater master plans**

The purpose of this strategy is to provide assistance to local governments through such means as cost-share funding, technical assistance, legislative initiatives, mapping, and other services provided directly by or contracted through SFWMD.

#### **C.3.3.1. Action Steps:**

1. Continue to coordinate an inter-agency LCH Stormwater Management Group.

SFWMD will provide technical assistance to local governments based on a prioritized schedule developed by the LCH Stormwater Management Group.

2. SFWMD will create a GIS layer identifying stormwater treatment methods/systems in conjunction with action step 3.1.1. A map of stormwater management systems will enable the targeting of areas with inadequate stormwater treatment.
  - a. Lee County, Charlotte County, Cape Coral, and Bonita Springs have prepared GIS maps of outfall locations for their NPDES permits. The Town of Fort Myers Beach has begun mapping them but the work is not completed yet. Otherwise, areas such as Glades and Hendry Counties, the City of Fort Myers, and the City of Sanibel are in need of mapping.

## **C.4. Habitat Assessment, Protection and Restoration Initiative**

### **C.4.1. Strategy: Habitat Mapping and Resource Assessment**

There is a perceived loss of beneficial uses in Lower Charlotte Harbor by the public (i.e. recreation, boating, fishing, etc.), particularly in association with periodic blooms of *Karenia brevis* (red tide), blue-green algae and red drift algae. Blooms of these plants directly affect water quality, fisheries, wildlife and even the economy. To protect and preserve the habitats and resources in the LCH watershed it is essential that management decisions be based on

sound scientific information. Mapping has been completed and is somewhat detailed in some basins, but is lacking in others. From complete inventories of both natural and disturbed habitats in the watershed, impacts to the system can be quantified and specific biological targets set.

#### **C.4.1.1. Action Steps:**

1. Review existing habitat mapping information and identify where data gaps exist. The compendium of maps should include fisheries/wildlife resources, seagrass, and benthic flora and fauna.
2. Evaluate sediment deposition and quality, and develop sediment management plans, as required.
3. Describe and assess floral and faunal species of concern, including fisheries resources, and link the locations of species of concern to habitat maps.
4. Coordinate with other regulatory and management entities to establish functional biological targets for the LCH for resource management purposes.
5. Assess the efficacy of BMPs for habitat creation and enhancement (i.e., mangrove planting, softening of seawalls, and installation of oyster substrate).

#### **C.4.2. Strategy: Habitat Protection and Management**

The protection and management of the LCH watershed is important aesthetically, environmentally and economically. Losses of light due to tannic freshwater inputs and turbidity from untreated stormwater runoff cause seagrass loss, and there are exotic and introduced species that compete with both terrestrial and aquatic endemic populations. The intent of this strategy is to at least maintain the “status quo” of important natural areas.

##### **C.4.2.1. Action Steps:**

1. Implement BMPs for shellfish areas.
2. Identify land acquisition opportunities to maintain wildlife corridors.
3. Evaluate mechanisms to improve fish access to tidal wetlands and bypasses for the S-79 structure.

#### **C.4.3. Strategy: Provide Habitat Enhancement and Restoration**

Through the mapping and assessment of resources in the watershed functional management targets can be developed for a variety of environmental resources, including shellfish, fisheries, and habitats. The purpose of this strategy is to enhance or restore the function of

adjacent degraded areas through selective habitat enhancement programs and projects to improve or maintain associated environmental resources.

#### **C.4.3.1. Action Steps:**

1. SFWMD will support efforts to develop effective strategies with clear targets for habitat protection, and where appropriate, enhancement and restoration.
2. SFWMD will facilitate habitat restoration initiatives in cooperation with local governments and other agencies. These projects may include disturbed habitat enhancement, exotic vegetation control, shoreline revegetation and stabilization, and saltmarsh and benthic habitat restoration and enhancement.
3. Develop targets for natural resource goals that in turn will help to identify funding limits necessary to meet the targets.

### **C.5. Outreach Initiative**

#### **C.5.1. Strategy: Provide Public Education and Outreach**

There is a broad cross-section of interest groups and individuals within the LCH watershed that are served by SFWMD. However, it is perceived that a clear understanding of water resource issues is either limited or misconstrued within these groups. Educating the public, including governmental agencies and elected officials about water quality issues, and involving the public in protecting water resources is needed to advance the mission and achieve the objectives of SFWMD.

#### **C.5.1.1. Action Steps:**

1. Identify gaps in the awareness of water quality issues within the LCH watershed. Evaluate this awareness for the public, elected officials and other decision makers through a survey, or other means.
  - Consider the following issues in the evaluation:
    - a. Awareness of where water flows to and from
    - b. Awareness of water quality impacts from development and agriculture
    - c. Local knowledge of how individuals (homeowners) can protect water quality
2. Based on survey results, provide informational and educational sessions for elected officials on the timeliness of decision-making regarding water resource issues – the importance to act now rather than later.
  - Use the education process to better involve local elected officials and build partnerships.
  - Enhance the political will by promoting the need for politicians to “do the right thing” to improve water quality.

3. Based on survey results, provide educational sessions for the public on water quality issues to increase awareness of issues.
  - Consider the relationship between permitting and water quality protection.
  - Consider addressing the nexus between water quality, water supply, and development.
  - Consider addressing the nexus between urban growth, water supply, and the limits to groundwater.
  - Where appropriate draw upon expertise and networks of outside resource agencies.

### **C.5.2. Strategy: Provide Regulatory Outreach**

The TMDL process is primarily an FDEP initiative, though it involves all levels of government and the public. As the process moves forward in the LCH watershed it is important keep all entities up to date on the progression of this process. As the regional representative of FDEP, SFWMD may provide that assistance.

#### **C.5.2.1. Action Steps:**

1. Coordinate with local governments, elected officials, and the public during the TMDL process.
  - Consider establishing a TMDL taskforce or workgroup

## **C.6. Funding Initiative**

### **C.6.1. Strategy: Funding Development**

The purpose of this strategy is to find other sources of dedicated funding for water quality projects throughout the LCH watershed. Applicable Initiatives are shown in parentheses after the action step.

#### **C.6.1.1. Action Steps:**

1. Seek funding for enhancement and protection of publicly owned lands.
  - The acquisition of new lands, such as the Babcock Ranch, provides new opportunities for water quality enhancement and protection. However, funding must be identified to accomplish those enhancements. (Water Quality)
2. Assist local governments seeking federal and state funding for land acquisition, design, construction of regional stormwater retrofit projects, and other capital improvement projects for water quality treatment. (Watershed Master Planning)
3. Where feasible, encourage and cost-share with local governments to install alternative stormwater treatment mechanisms using low impact design principles. (Watershed Master Planning & Implementation)

4. Seek cost-share or direct funding of a prioritized retrofit program. (Watershed Master Planning & Implementation)
5. Identify cost-sharing opportunities with local governments and other agencies to facilitate habitat restoration initiatives. These projects may include disturbed habitat enhancement, exotic vegetation control, shoreline revegetation and stabilization, and saltmarsh and benthic habitat restoration and enhancement. (Habitat Assessment, Protection and Restoration)
6. Continue collaboration with the CHNEP and annual funding for ongoing efforts to protect and restore LCH. Continuation of funding would be dependent upon available funding and SFWMD Governing Board Approval.



## **SECTION D.**

### **MEASURES NEEDED TO MANAGE AND MAINTAIN LOWER CHARLOTTE HARBOR WATERSHED**

This section is provided to describe and discuss the process by which SFWMD will support FDEP in the establishment of TMDLs in the LCH as required by Chapter 62-40.432 F.A.C. Over 160 water bodies within the jurisdictional boundaries of SFWMD have been included in the 1998 or subsequent §303(d) Lists of Impaired Waters and require the development of Total Maximum Daily Loads (TMDLs). SFWMD faces a number of challenges in managing its responsibilities of the overall TMDL process in the complex South Florida natural and political environments.

#### **D.1. Background**

Section 303(d) of the Clean Water Act (CWA) requires states to submit lists of surface waters that do not meet applicable water quality standards (impaired waters) after implementation of technology-based effluent limitations, and establish Total Maximum Daily Loads (TMDLs) for these waters on a prioritized schedule. TMDLs establish the maximum amount of a pollutant that a water body can assimilate without causing exceedances of water quality standards. As such, development of TMDLs is an important step toward restoring our waters to their designated uses. In order to achieve the water quality benefits intended by the CWA, it is critical that TMDLs, once developed, be implemented as soon as possible. Hundreds of waterbodies in Florida have been determined to be impaired and will each require one or more TMDLs. Statewide, the cost of implementing TMDLs has been estimated at between \$1 billion and \$5 billion, with the higher number more likely. Florida DEP has the state lead in this effort, and in some basins, US EPA works in concert with DEP to establish the TMDL. DEP develops TMDLs for waters that have “verified” water quality impairments, verified through Florida’s Impaired Waters Rule methodology. EPA develops TMDLs for 1998 303(d) list waters for which DEP had insufficient data to support evaluation.

The 303(d) List is based primarily on the state’s 1998 305(b) Water Quality Assessment Report (“305(b) report”), which uses a watershed approach to evaluate the state’s surface waters, ground waters, and wetlands. All existing and readily available water quality related data (chemical, physical, and biological) and information were assembled and evaluated in the development of the 305(b) report, including but not limited to data in EPA’s STOrage and RETrieval (STORET) database, the Statewide Biological Database (biological assessments), and fish consumption advisory information. To obtain more recent data, staff in the DEP’s Division of Water Resource Management met with staff from the state’s five Water Management Districts, solicited information from DEP and district staff, and received input from the public. All readily available data and information were used in the development of the 303(d) List. EPA guidelines specify waters need not be included if other federal, state or local requirements have or are expected to result in the attainment and maintenance of applicable water quality standards.

## **D.2. How The List Is To Be Used**

Chapter 99-223, Laws of Florida, sets forth the process by which the 303(d) list is refined through more detailed water quality assessments. However, this law has not received formal approval from EPA. The state and EPA differ in methodologies for determination of “impairment.” Through a court-mandated consent decree, EPA must set TMDLs for the water bodies on the 1998 303(d) list regardless of scientific assessment methods outlined in Ch 99-223, FAC. This law also establishes the means for developing and adopting TMDLs, allocating pollutant loadings among contributing sources, developing pollution reduction strategies, referred to as Basin Management Action Plans (BMAPs), and implementing BMAPs and monitoring results.

Implementation of TMDLs refers to any combination of regulatory, non-regulatory, or incentive-based actions that attain the necessary reduction in pollutant loading. Non-regulatory or incentive-based actions may include development and implementation of Best Management Practices (BMPs), pollution prevention activities, and habitat preservation or restoration. Regulatory actions may include issuance or revision of wastewater, stormwater, or environmental resource permits to include permit conditions consistent with the TMDL and BMAP requirements. These permit conditions may be numeric effluent limitations or, for technology-based programs, requirements to use a combination of structural and non-structural BMPs needed to achieve the necessary pollutant load reduction.

## **D.3. The Watershed Management Program**

TMDLs will be developed, allocated and implemented through a watershed-based approach. Over the next few years, SFWMD will be providing technical and other support to DEP in adopting the TMDLs, allocating pollutant loadings among contributing sources, and implementing pollution reduction strategies in south Florida. The intent is to provide as much support as practical, but SFWMD resource limitations will ultimately determine the level of support. In basins where SFWMD has on-going water quality programs, a greater opportunity exists for a higher level of support than in those basins without active projects. A summary of the potential opportunities for this coordination is presented in Table 12.

**Table 12. Opportunities for SFWMD TMDL Involvement**

DEP or Other Agencies	SFWMD Possible Involvement
<b>Phase 1 – Preliminary Evaluation of Water Quality</b>	
DEP conducts an initial water quality assessment in the basin involving close coordination with local stakeholders	Assist in identifying major issues of concern in the basin Timely upload of SFWMD data to STORET database Assist in identifying local data providers
DEP develops a strategic monitoring plan	Assist in identifying data gaps Comment on strategic monitoring plan
DEP develops a preliminary Basin Status Report that includes a list of potentially impaired waters	Comment on preliminary Basin Status Report
<b>Phase 2 – Strategic Monitoring and Assessment to verify water quality impairment</b>	
DEP, in cooperation with local monitoring entities and WMDs, conducts strategic monitoring to meet priority information needs	Collect additional data if identified via strategic monitoring plan Timely upload of SFWMD and other data to STORET
DEP conducts integrated monitoring assessment using EPA guidance	Comment on integrated monitoring assessment in a timely manner
DEP revises planning list and a draft verified list of impaired waters for public comment	Comment on revised planning list and draft verified list in a timely manner
DEP develops a Basin Assessment Report	Comment on Basin Assessment Report in a timely manner
<b>Phase 3 – Development and Adoption of TMDLs</b>	
DEP will develop and adopt TMDLs and <i>"reasonable and equitable load allocations"</i> among point and nonpoint sources for water bodies or segments on the adopted verified list of impaired waters, with input from stakeholders. DEP establishes TMDLs for water bodies or water segments verified as impaired, using computer modeling to estimate nonpoint source loadings and establish the water body's assimilative capacity.	Comment on model framework, including model requirements, parameters to be modeled, model endpoints, design run scenarios, and preliminary allocations in a timely manner Identify other stakeholders that should be involved in the process
DEP will communicate to the public the science used in the TMDL process	Assist in communication of the science used in the TMDL process to the public
DEP will host public workshops for rule adoption of TMDLs: and allocations	Attend public workshops for rule adoption of TMDLs and allocations

DEP or Other Agencies	SFWMD Possible Involvement
<b>Phase 4 – Development of Basin Management Action Plan to Achieve the TMDL</b>	
DEP will invite parties potentially affected by TMDLs to participate in discussions on allocations and implementation strategies.	Participate in discussions on allocations and implementation strategies Assisting to identify existing and proposed management activities Identify other parties potentially affected
DEP will work with WMDs, DACS, and other agencies to provide technical resources and assistance to stakeholder group and help identify potential funding mechanisms available to achieve load reductions	Provide technical resources and assistance to stakeholder group and help identify potential funding mechanisms available to achieve load reductions.
Affected stakeholders will work with DEP and other affected agencies to reach consensus on load reduction allocations and strategies, leading to development of a BMAP to achieve established TMDLs.	Review and comment on load reduction allocations and strategies developed by DEP in a timely manner Assist in development of the Basin Management Action Plan (BMAP)
DEP will make the BMAP available for public review and comment.	Comment on BMAP in a timely manner Assist in disseminating the BMAP for public review and comment Participate in public meetings Revise existing district surface water management and ERP rules and regulations where necessary
DEP will incorporate the BMAP into existing management plans where feasible	Assist in identifying existing management plans Assist in incorporating BMAP into existing management plans
<b>Phase 5 – Implementation of the BMAP and Monitoring of Results</b>	
DEP will coordinate the implementation of TMDLs, as directed by the Florida Watershed Restoration Act, which may be carried out through nonregulatory and existing regulatory water quality protection programs.	Assist in implementation of TMDLs through appropriate WMD regulatory and nonregulatory programs Assist in identifying non-regulatory water quality protection programs
DACS to take the lead in ensuring that allocations to agricultural nonpoint sources are met, and will work with farmers in the basin to develop and facilitate BMP implementation, including assistance in obtaining funding.	Assist DACS and DEP where appropriate in development and implementation of BMPs
Other regional and state agencies will assist in implementation as provided in the BMAP.	Assist in implementation as provided in the BMAP
Local entities will implement local government NPDES stormwater programs, local restoration projects, private sector partnerships, BMPs, etc., as provided in the BMAPs.	Provide updates to DEP on those local programs and projects for which SFWMD has oversight or involvement

#### **D.4. SFWMD's Role in the TMDL Verification Process**

**Information Sharing** is a critical first step in working with FDEP to develop meaningful TMDLs. The best available data and information regarding hydrology, hydraulics, and water quality data for South Florida is not necessarily in FDEP's *Florida STORET Database*. Portions of the best available data reside within the District's files, databases and GIS coverages, and some is kept in City and County data and mapping repositories. It is only through effective and focused communications, with subsequent coordination, that these data will be incorporated in the *Florida STORET Database* and then included in the development of State and Federal TMDLs. Establish how the District will share information, validate TMDL models and confirm pollutant load allocations.

**Reviewing Models and Assessments** that are being developed by FDEP will be essential to accepting subsequent TMDLs. The combination of the comparatively short compliance period of the USEPA Consent Decree and manpower constraints that exist within FDEP have produced compressed timeframes. The "first cycle" TMDLs are based upon models that are being challenged by regulated communities and third party interest alike. FDEP's acceptance of these models must be carefully considered with respect to long-term management implications, both financially and politically.

**Reviewing Pollutant Loads and Allocations** will be critical given the high cost of designing and implementing capital projects to reduce annual stormwater pollutant loads. It is essential that the District and the communities with impaired water bodies make all reasonable efforts to review the assessments, modeling, conclusions and allocations contained within State and Federal TMDLs and provide comments to DEP prior to their final adoption. The identification and proper handling of statistical outliers are particularly important because of their influence on loads and allocations if they are not removed. It is difficult, if not impossible, to change inaccurate load allocations once they have been adopted.

**Development of Basin Management Action Plans (BMAPs)** that are fair and equitable is a very significant challenge to be faced by SFWMD. The District must recognize and embrace the duality of BMAP development and implementation as it is responsible for the conveyance issues in works of SFWMD. Surface water management and ERP regulations for new development may need to be changed to reflect negotiated requirements of the BMAP. SFWMD will play a central role where appropriate in the planning, coordinating, scheduling and funding of cooperative projects that will form the foundation for the subsequent implementation of the BMAPs.



## **SECTION E.**

### **SCHEDULE & FUNDING REQUIREMENTS FOR RESTORATION & PROTECTION**

Using the “Strategies for Restoration or Protection” to accomplish the Initiatives and Strategies set forth in Section C, the following schedule and funding requirements have been devised.

In addition to this schedule, periodic program reviews will be undertaken by SFWMD to evaluate the outcome of ongoing and completed projects and Action Steps within each Initiative. The intent of the review is to identify opportunities to refine and enhance the SWIM Plan.

As a living document, the periodic updates will also reflect findings and recommendations of the Southwest Florida Feasibility Study as it appropriately relates to the LCH watershed and its water quality improvements, and reflect changes associated with TMDLs that are developed by DEP.

#### **Water Quality Initiative (C.1.)**

**Strategy: Utilize the Existing Water Quality Monitoring Network to Assess the Origin and Fate of Pollutants (C.1.1.)**

##### **Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Evaluate existing water quality data	24	\$50K	\$50K			
2-Identify pollutant sources and assess removal efficiencies	24		\$50K	\$50K		
3-Investigate non-point residential discharges, Implement new sampling plan	48		\$125K	\$125K	\$125K	\$125K
4-Identify short-term enhancement goals	24			\$50K	\$25K	
	Totals	\$50K	\$225K	\$225K	\$150K	\$125K

**Strategy: Hydrologic and Hydrodynamic Water Quality Modeling (C.1.2.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Evaluate existing data for model development and testing	12	\$50K				
2-Investigate the fate of water quality constituents via models			\$100K	\$100K	\$100K	\$100K
3-Coordinate model activities with DEP and CERP			\$25K	\$25K	\$25K	\$25K
	Totals	\$50K	\$125K	\$125K	\$125K	\$125K

**Strategy: Enhancement and Maintenance of Surface Waters (C.1.3.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Develop adaptive management interventions	12	\$20K				
2-Assess low impact development practices and water quality banking	12		\$20K			
3-Facilitate development of drainage maintenance BMPs	12		\$30K			
4-Encourage maintenance of drainage conveyances	36			\$10K	\$10K	\$10K
	Totals	\$20K	\$50K	\$10K	\$10K	\$10K

## Stormwater Quantity Initiative (C.2.)

**Strategy: Improve the timing of freshwater flows into Lower Charlotte Harbor (C.2.1.)**

### Schedule & Funding

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Investigate mechanisms for improving stormwater storage	36	\$50K	\$50K	\$50K		
2-Investigate the impact of the Lake Okeechobee schedule on salinity	24		\$50K	\$50K		
3-Assess the effects of watershed loss and channelization	24		\$20K	\$20K		
4-Consider rulemaking to increase onsite retention	24				\$30K	\$25K
	Totals	\$50K	\$120K	\$120K	\$30K	\$30K

**Strategy: Regulatory Assessment (C.2.2.)**

### Schedule & Funding

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Evaluate local regulations to provide enhanced water quality	12	\$25K				
	Totals	\$25K				

## Watershed Master Planning & Implementation Initiative (C.3.)

**Strategy: Evaluate existing watershed master plans (C.3.1.)**

### Schedule & Funding

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Examine coverage of stormwater plans	12	\$50K				
2-Evaluate existing plans for flood abatement and water quality improvement	12		\$50K			
	Totals	\$50K	\$50K			

**Strategy: Assist in the development and endorsement of local master stormwater plans and implementation schedules (C.3.2.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Assist in the design of master plans	36			\$200K	\$200K	\$200K
2-Coordinate with local governments for stormwater retrofit opportunities	60	\$10K	\$10K	\$10K	\$10K	\$10K
	Totals	\$35K	\$35K	\$35K	\$35K	\$35K

**Strategy: Partner with local governments to implement existing plans (C.3.3.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Continue to coordinate an LCH stormwater management group	60	\$15K	\$15K	\$15K	\$15K	\$15K
2-Provide technical assistance	60					
3- Create a GIS layer identifying stormwater treatment methods/systems.	24		\$35K	\$20K		
	Totals	\$15K	\$50K	\$35K	\$15K	\$15K

**Habitat Assessment, Protection and Restoration Initiative (C.4.)**

**Strategy: Habitat Mapping and Resource Assessment (C.4.1.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1- Identify gaps in mapping data	12	\$25K				
2-Develop and implement a sediment assessment plan	60	\$20K	\$50K	\$50K	\$50K	\$50K
3-Describe and assess species of concern	24	\$100K	\$100K			
4- Establish functional biological targets for estuarine ecosystems.	36			\$20K	\$20K	\$20K
5- Assess the efficacy of BMPs for habitat creation	48		\$10K	\$10K	\$10K	\$10K
	Totals	\$145K	\$160K	\$80K	\$80K	\$80K

**Strategy: Habitat Protection & Management (C.4.2.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1- Implement BMPs for shellfish areas	48		\$20K	\$20K	\$20K	\$20K
2-Identify land acquisition needs for wildlife corridors*	60	\$25K		\$25K		\$25K
3-Evaluate mechanisms to improve fish access	24			\$25K	\$25K	
	Totals	\$25K	\$20K	\$70K	\$45K	\$45K

\*Land acquisition is a separate District wide process

**Strategy: Provide Habitat Enhancement and Restoration (C.4.3.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Support local habitat protection programs	60	\$20K	\$20K	\$20K	\$20K	\$20K
2-Facilitate habitat restoration projects	60		\$300K	\$300K	\$300K	\$300K
3-Develop targets for natural resource goals.	12	\$30K				
	Totals	\$50K	\$320K	\$320K	\$320K	\$320K

**Outreach Initiative (C.5.)**

**Strategy: Provide Public Education and Outreach (C.5.1.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1- Identify gaps in awareness of water quality issues	12	\$50K				
2-Provide elected officials educational sessions	48		\$20K	\$20K	\$20K	\$20K
3-Provide the public educational sessions	48		\$20K	\$20K	\$20K	\$20K
	Totals	\$50K	\$40K	\$40K	\$40K	\$40K

**Strategy: Provide Regulatory Outreach (C.5.2.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1-Coordinate with local governments during the TMDL process	60	\$15K	\$15K	\$15K	\$15K	\$15K
	Totals	\$15K	\$15K	\$15K	\$15K	\$15K

**Funding Initiative (C.6.)**

**Strategy: Funding Development (C.6.1.)**

**Schedule & Funding**

Action Step	Time Frame (months)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1- Seek funding for enhancement and protection of public lands	60	\$500K	\$500K	\$500K	\$500K	\$500K
2-Assist local governments seeking funds for land acquisition	60	\$50K	\$50K	\$50K	\$50K	\$50K
3-Encourage cost-share for alternative stormwater treatment	60	\$500K	\$500K	\$500K	\$500K	\$500K
4- Seek cost-share or direct funding for retrofit projects	60	\$450K	\$450K	\$450K	\$450K	\$450K
5- Identify cost-sharing opportunities for habitat restoration	60	\$50K	\$50K	\$50K	\$50K	\$50K
6-Collaboration with CHNEP	60	\$50K	\$50K	\$50K	\$50K	\$50K
	Totals	\$2.1M	\$2.1M	\$2.1M	\$2.1M	\$2.1M



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## Appendix I. Governmental Units & Implementation Partners

SFWMD recognizes the importance of coordination with the many government agencies and other stakeholders that may be affected by, or have some jurisdiction over resources within the LCH SWIM planning area. Governmental units that have jurisdiction over Lower Charlotte Harbor and its drainage basin include Federal and State agencies and the SFWMD. The Watershed also lies within the boundaries of the Southwest Florida Regional Planning Council (SWFRPC). Table 4 lists all agencies and stakeholders.

<b>Agencies and Stakeholders</b>	
<b>Federal</b>	
U.S. Army Corps of Engineers	U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency	U.S. Forestry Service
U.S. Geologic Survey	Charlotte Harbor National Estuary Program
National Oceanic & Atmospheric Administration	Natural Resources Conservation Service
<b>State</b>	
Florida Department of Environmental Protection	Department of Community Affairs
Public Service Commission	Department of Health
Department of Transportation	Department of Agriculture and Consumer Affairs
Florida Fish and Wildlife Conservation Commission	Florida Gulf Coast University
<b>Regional</b>	
South Florida Water Management District	West Coast Inland Navigation District
Southwest Florida Regional Planning Council	Southwest Florida Water Management District
Estero Bay Agency on Bay Management	
<b>Municipal</b>	
Charlotte County	Hendry County
Glades County	Lee County
Bonita Springs	LaBelle
Cape Coral	Moore Haven
Fort Myers	Sanibel
Fort Myers Beach	Clewiston
<b>Unincorporated Communities</b>	
Estero	San Carlos Park
Lehigh Acres	South Fort Myers
North Fort Myers	Alva
St. James City	
<b>Stakeholders</b>	
Conservancy of Southwest Florida	Corkscrew Regional Ecosystem

<b>Agencies and Stakeholders</b>	
	Watershed Trust
*Special Taxing Districts	Mosquito Control Districts
Calusa Land Trust	Audubon Society
Charlotte Harbor Environmental Center	Southwest Florida Watershed Council
South Florida Ecosystem Restoration Task Force	Sanibel-Captiva Conservation Foundation
Water Enhancement and Restoration Coalition	

\*Special Districts within the Study Area that are relevant to surface water improvement and management are listed on page 29 of the Reconnaissance Report.

**Appendix II. Surface water discharge facilities operating with a permit.**

Facility ID	Name	Address	City
	<b>Domestic Wastewater</b>		
FL0040665	City Of Clewiston WWTP	115 W Ventura Ave	Clewiston
FL0030007	City Of Cape Coral	1800 Everest Pkwy	Cape Coral
FL0021261	Fort Myers Central AWWTF	1501 Raleigh St	Fort Myers
FL0021270	Fort Myers South AWWTP	1618 South Dr	Fort Myers
FL0039829	Lee County Utilities - Fiesta Village	1366 San Souci Dr	Fort Myers
FL0145190	Three Oaks WWTF	18521 3 Oaks Pkwy	Fort Myers
FL0030325	Waterway Estates Advanced WWTP	1667 Inlet Dr	North Fort Myers
	<b>Industrial Wastewater</b>		
	<b>Concrete Batch Plants</b>		
FLG110361	Miami Valley Concrete Placida Plant	5250 Woodfield Rd.	Charlotte
FLG110645	Punta Gorda Summit Ready Mix Plant	26451 Mallard Way	Charlotte
FLG110062	Krehling Industries Moore Haven Plant #15	1315 Fox Ln Sw	Moore Haven
FLG110039	Hare Lumber & Ready Mix Inc	425 E Haiti Ave	Clewiston
FLG110706	Florida Rock Labelle Concrete Batch Plant	South Industrial Loop	Labelle
FLG110065	Krehling Plant 9 Labelle	1101 Forestry Rd.	Labelle
FLG110338	Rinker Materials Corporation	25091 Old Hwy 41s	Bonita Springs
FLG110712	Florida Redi-Mix Pondella Road Cbp	1173 Pondella Road	Cape Coral
FLG110020	Krehling Cape Coral #11	2900 Pine Island Road	Cape Coral
FLG110047	Rinker Materials Corporation	2401 Pine Island Rd. Nw	Cape Coral
FLG110336	Central Concrete Super Mix	8020 Mainline Pkwy	Fort Myers
FLG110684	Drake Cement	15460 Alico Rd	Fort Myers
FLG110722	Ecrete Industries Inc	4170 Canal St	Fort Myers
FLG110674	Florida Redi-Mix West Lakes Concrete Batch Plant	15450 Alico Rd	Fort Myers
FLG110314	Green Meadows Ready Mix	14361 Alico Rd	Fort Myers
FLG110057	Krehling Plant 3 Ft Myers	2225 Rockfill Rd	Fort Myers
FLG110112	Krehling Plant 7 Gator Road	16690 Gator Rd	Fort Myers
FLG110050	Rinker Materials Corporation	7270 Alico Rd	Fort Myers
FLG110640	Rinker Materials Of Florida Inc	PO Box 4262	Fort Myers
FLG110029	Schwab Ready Mix Inc	7290 Alico Rd	Fort Myers
FLG110538	Summit Ready Mix	4170 Canal St	Fort Myers
FLG110643	University Lakes Concrete Batch Plant	15200 Alico Road	Fort Myers
FLG110689	West Lakes Concrete Plant	2510-1 Rockfill Road	Fort Myers
FLG110025	Florida Rock Industries Inc (N Ft Myers)	1409 Pondella Rd	North Fort Myers
FLG110021	Oldcastle Precast Inc	2140 Pondella Rd	North Fort Myers
FLG110028	Schwab Ready Mix Inc	2110 Pondella Rd	North Fort Myers
	<b>Other Industrial Wastewater</b>		
FL0473804	Stormwater Treatment Area 6	Everglades Agricultural Area	Clewiston

<b>Facility ID</b>	<b>Name</b>	<b>Address</b>	<b>City</b>
FL0339644	SFWMD - Caloosa. River ASR Pilot Cycle Test	South of SR 80	La Belle
FL0040088	Cape Coral Rev Osmosis WTP	SW 20th Avenue	Cape Coral
FL0001490	FPL Fort Myers Plant	10650 Palm Beach Blvd	Fort Myers
FL0025593	Island Water Assoc-Sanibel Island	3425 Sanibel Captiva Rd	Sanibel
	<b>Petroleum Cleanup</b>		
FLG911890	Merit Pure Station (Merit Shell)	PO Box 816	Labelle
FLG912087	Circle K Store #4729	2505 Santa Barbara Blvd	Cape Coral
	<b>Concentrated Animal Feeding Operation</b>		
FLA284629	Graham Farms	US 27 North of Moore Haven	Moore Haven



### Appendix III. Facilities possessing multi-sector general permits.

Facility ID	Name	Address	City
FLR05A559	Jack M Berry Inc	3655 State Road 80 West	Alva
FLR05C459	Bonita Springs Utilities WWTP	25051 S Tamiami Trl	Bonita Springs
FLR05F588	Modern Recycling Tire Storage Area	24278, 24296, 24111 And 24297 Production	Bonita Springs
FLR05F851	Ott Welding	24241 Production Cir	Bonita Springs
FLR05F470	S & S Structural Systems, Inc.	25095 Old 41 Rd	Bonita Springs
FLR05B544	Action Craft	2603 Andalusia Blvd	Cape Coral
FLR05B069	Shamrock Div Of Kcs	905 Se 9th Terr	Cape Coral
FLR05G418	Williamson & Sons Marine Const	2411 Pine Island Rd NW	Cape Coral
FLR05B630	Blount Automotive	508 E Haiti Ave	Clewiston
FLR05G173	City Of Clewiston WWTP	3025 Ussc Gate B Rd	Clewiston
FLR05C078	Clewiston Transfer Station	1350 S Olympia St	Clewiston
FLR05F500	Clewiston Transfer Station	1350 S Olympia St	Clewiston
FLR05G163	Jolly Roger Marina	1095 E Hwy 27	Clewiston
FLR05B833	Southern Gardens Citrus Processing	Po Box 130	Clewiston
FLR05F530	RMCSouth Florida Materials	14500 Corkscrew Rd	Estero
FLR05E177	P&S Auto Salvage	3800 Se Palmatto	Fort Myers
FLR05F546	A & D Scrap Materials, Inc	3066 Cranford Ave	Fort Myers
FLR05F584	AAA Cooper Transportation	1720 Benchmark Ave	Fort Myers
FLR05C308	Airborne Express	15960 Chamberlin Parkway	Fort Myers
FLR05G007	Ajax Asphalt Plant Ft Myers	7121 Pennsylvania St	Fort Myers
FLR05B381	American Eagle Airlines Inc	11000 Terminal Access Rd	Fort Myers
FLR05E245	American Freightways - Fmy	16250 Old Us 41	Fort Myers
FLR05F382	Aviation Solutions Management Group At SW FI Intl Airport	16000 Chamberlin Pkwy	Fort Myers
FLR05F896	Bottling Group, LLC	3625 Dr Martin Luther King Blvd	Fort Myers
FLR05A964	Cement Industries Inc	2709 Jeffcott St	Fort Myers
FLR05C437	Central AWWT Facility	1501 Raleigh St	Fort Myers
FLR05B746	Chem Polymer Corporation	2443 Rockfill Rd	Fort Myers
FLR05F545	Coastal Precast Of Florida, Inc	7100 Pennsylvania St	Fort Myers
FLR05G133	Continental Airlines Inc	16000 Chamberlin Pkwy	Fort Myers
FLR05C550	Con-Way Southern Express	1870 Benchmark Ave	Fort Myers

Facility ID	Name	Address	City
FLR05C473	Damron-Lkq Auto Parts Inc	5001 State Rd 82	Fort Myers
FLR05C095	Dean Steel Buildings Inc	2929 Industrial Ave	Fort Myers
FLR05F712	Deep Lagoon Boat Club	14030 McGregor Blvd	Fort Myers
FLR05D107	Edison Bulk Plant	2612 Edison Ave	Fort Myers
FLR05A495	Federal Express Corp	15960 Chamberlin Pkwy	Fort Myers
FLR05A671	Fedex Express-Fmya	12501 Metro Pkwy	Fort Myers
FLR05F394	Fedex Ground	2670 Colonial Blvd	Fort Myers
FLR05F786	Fedex National Ltl Inc - Ftm	4575 Laredo Ave	Fort Myers
FLR05B998	Fiesta Village AWWTP	1366 San Souci Dr	Fort Myers
FLR05F643	Fish Tale Marina	7225 Estero Blvd.	Fort Myers
FLR05B338	Florida Rock & Tank Lines Inc	3356 Highland Ave	Fort Myers
FLR05D008	Forestry Resources, Inc	4353 Michigan Link	Fort Myers
FLR05F449	FRS Fort Myers	2465 Highland Ave	Fort Myers
FLR05A287	Ft Meyers Vmf	2629 N Airport Rd	Fort Myers
FLR05F920	Ft. Myers	10868 Metro Pkwy	Fort Myers
FLR05F603	Garden Street Iron & Metal Inc.	3350 Metro Pkwy	Fort Myers
FLR05F431	Garden Street Paper Product Corp	2998 South St	Fort Myers
FLR05G128	Griffin Industries Inc	8181 Katanga Ct	Fort Myers
FLR05E134	Gulf Coast Landfill/Gulf Disposal, Inc	11990 State Road 82	Fort Myers
FLR05C461	Gulf Coast Precast Inc	2506 Precast Ct	Fort Myers
FLR05E312	Gulfshore Maintenance And Helicopters, Inc At Page Field	325 Danley Dr	Fort Myers
FLR05F542	Guymann Construction Of Florida, Inc.	7100 Pennsylvania St	Fort Myers
FLR05G411	Hanson Roof Tile Inc	2451 Crystal Dr	Fort Myers
FLR05B808	HJHeinz Lp	5521 Division Dr	Fort Myers
FLR05F569	Lause Warehouses	3460 Metro Pkwy	Fort Myers
FLR05B588	Lee County Resource Recovery	10500 Buckingham Rd	Fort Myers
FLR05C343	Mattingly Tile Company	3030 Palm Ave	Fort Myers
FLR05C387	Munters Corp	108 6th St	Fort Myers
FLR05E150	Northwest Airlines Inc @ Sw FI Intl Airport	16000 Chamberlin Pkwy Ste 5623	Fort Myers
FLR05A513	Page Field Airport	501 Danley Dr	Fort Myers
FLR05C477	Pall Aeropower Corporation	4245 Evans Ave	Fort Myers
FLR05B246	Rinker Materials - Concrete Pipe Division - Plant City	2040 Ortiz Ave	Fort Myers
FLR05C236	Roadway Express Inc (T728)	1660 Benchmark Ave	Fort Myers
FLR05F720	Robbins Manufacturing Company	3250 Metro Pkwy	Fort Myers
FLR05F371	Ryan Tire & Petroleum	2650 Edison Ave	Fort Myers

Facility ID	Name	Address	City
	Inc		
FLR05F984	SMI Florida Fabricators	2665 Prince St	Fort Myers
FLR05C436	South AWWT Facility	1618 South Dr	Fort Myers
FLR05C135	Southeast Paper Recycling Co	6180 Federal Ct	Fort Myers
FLR05A512	Southwest FI Intl Airport	11000 Terminal Access Rd	Fort Myers
FLR05A510	Southwest FI Intl Airport	16000 Chamberlin Pkwy Ste 8671	Fort Myers
FLR05A503	Southwest FI Intl Airport	11000 Terminal Access Rd	Fort Myers
FLR05A500	Southwest FI Intl Airport	16000 Chamberlin Pkwy Ste 8671	Fort Myers
FLR05A499	Southwest FI Intl Airport	16000 Chamberlin Pkwy Ste 8671	Fort Myers
FLR05A498	Southwest FI Intl Airport	11000 Terminal Access Rd	Fort Myers
FLR05A497	Southwest FI Intl Airport	16000 Chamberlin Pkwy Ste 8671	Fort Myers
FLR05A496	Southwest FI Intl Airport	11000 Terminal Access Rd	Fort Myers
FLR05F871	Southwest Structural Systems Inc	5774 Corporation Cir	Fort Myers
FLR05F566	Stock Building Supply	3601 Work Dr	Fort Myers
FLR05B260	Tamiami Concrete Products Inc	2411 Crystal Dr	Fort Myers
FLR05G026	The Emmette P Waite Jr Public Works Center	4200 Dr Martin Luther King Blvd	Fort Myers
FLR05F907	Three Oaks Wastewater Treatment Plant	18521 3 Oaks Pkwy	Fort Myers
FLR05A509	United Airlines At Southwest FI Intl Airport	16000 Chamberlin Pkwy	Fort Myers
FLR05B860	United Parcel Service Inc	2811 Cargo St	Fort Myers
FLR05F910	Universal Pipe & Steel Supply, Inc	2200 Flint Dr	Fort Myers
FLR05G443	Ups - Fort Myers Gateway	15960 Chamberlin Pkwy	Fort Myers
FLR05B290	Ups Ground Freight	4511 Cummins Ct	Fort Myers
FLR05F607	Vsi Mobilmix	3640 Work Dr	Fort Myers
FLR05C296	Allied Recycling Inc	3770 Palmetto Ave	Fort Myers
FLR05F543	M-31 Marina LLC	16991 Sr 31	Fort Myers
FLR05F432	Onyx Waste Services Of Florida, Inc	17101 Pine Ridge Road	Fort Myers
FLR05F618	Compass Rose Marina, Inc.	1195 Main St	Fort Myers Beach
FLR05C392	Ft Myers Beach WWTF	17155 Pine Ridge Rd	Fort Myers Beach
FLR05B314	Gulf Marine Ways & Supply Inc	1148 Main St	Fort Myers Beach
FLR05F549	Gulf Star Marina	742 Fishermans Wharf	Fort Myers Beach
FLR05F688	Mid Island Beach Marina	4765 Estero Blvd	Fort Myers Beach
FLR05F537	Olsen Marine Service	1100 Main St	Fort Myers Beach
FLR05C415	Airglades Airport	Airglades Industrial Park	Labelle
FLR05E192	Citrus Belle	State Rd 29, 6 Mi South Of Labelle	Labelle
FLR05F453	FRS Labelle	1378 N SR29 N	Labelle
FLR05C414	Labelle Municipal Airport	307 E Cowboy Way	Labelle
FLR05C079	Labelle Transfer Station	420 Forestry Division Rd	Labelle
FLR05F501	Labelle Transfer Station	1280 Forestry Division Rd	Labelle

<b>Facility ID</b>	<b>Name</b>	<b>Address</b>	<b>City</b>
FLR05F789	Lehigh Acres WWTP	500 Construction Ln	Lehigh Acres
FLR05F416	Paver Module Plant Improvements	411 Leonard Blvd N	Lehigh Acres
FLR05G177	A-1 New & Used Parts	1050 Hwy 27 S	Moore Haven
FLR05G413	Oldcastle Lawn & Garden	4560 S Hwy 27	Moore Haven
FLR05G415	Caloosa Isle Yacht Club	1687 Inlet Dr	North Fort Myers
FLR05B999	Waterway Estates Awwtf	1667 Inlet Dr	North Fort Myers
FLR05F729	Bob And Annies Boatyard	3420 Stringfellow Rd	Saint James City
FLR05C253	Donax Water Reclamation Facility	930 Donax St	Sanibel
FLR05F559	Sanibel Marina Inc	634 N Yachtsman Dr	Sanibel

## Appendix IV. Local Government Capital Improvement Project List

One of the important roles that local government plays in maintaining water quality in the LCH is through the improvement and maintenance of stormwater water facilities, drainage easements, catch basins and other facilities under their jurisdiction. Ongoing capital improvement programs are costly, but necessary, and provide a good example of local governments' commitment to good water quality. Listed below, by SWIM plan Initiative and responsible entity (in alphabetical order), are the tentative 5-year capital improvement projects in the LCH. Projects listed include both those that have been identified as well as those that are actually scheduled to begin. The cost estimates for each project are cumulative totals for the five-years beginning with FY 2007. Cost estimates are given for each project, if available.

Capital Improvement Projects	Entity	Total Cost Estimate for Identified Projects
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### Water Quality Initiative Projects

Stormwater Improvements, Catch Basin Retrofit s	Cape Coral	
Canal Pump Station Aquifer Storage and Recovery (ASR) Wells; Project will be done in phases.	Cape Coral	\$1,000,000 to \$9,000,000
Stormwater Outfall Remediation Measures Phase I	City of Bonita Springs	\$50,000
Billy Creek Filter Marsh Park, (Phases)	City of Fort Myers	\$1,000,000
Ten Mile Canal Detention Storage & WQ Treatment Area	City of Fort Myers	\$845,000
Shoemaker-Zapato Storage & WQ Treatment	City of Fort Myers	\$240,000
Carrel Canal (FMCC) WQ Improvements	City of Fort Myers	\$500,000
Ford Canal WQ Treatment Area	City of Fort Myers	\$285,000
Manuel's Branch Outfall Siltation Facility	City of Fort Myers	\$95,000
Lee County 2020 WQ Treatment Area	City of Fort Myers	\$395,000
Winkler Canal Filter Marsh	City of Fort Myers	\$350,000
Galloway Canal Storage & WQ Treatment Area	City of Fort Myers	\$265,000
Sanibel Bayous Collection System Connection to City Sewer	City of Sanibel	\$295,000

Phase 4, of Sanibel Sanitary Sewer Expansion Program; this will finalize the completion of a \$65,000,000 project that has span almost ten years	City of Sanibel	\$1,200,000
Stormwater, Casa Ybel Rd, Treatment Structure/Filter Marsh	City of Sanibel	\$500,000
Perwinkleway, Stormwater Treatment Facility	City of Sanibel	\$250,000
Dixie Beach Blvd, Stormwater Treatment Facility	City of Sanibel	\$250,000
Glades County WQ Improvement Projects	Glades County	
Port LaBelle, Sanitary Sewer Line Expansion	Hendry County	\$1,300,000
Banyan Village, Sewer & Water Line Expansion	Hendry County	\$4,500,000
Yellow Fever Creek/Gator Slough	Lee County	\$600,000
Lakes Park Water Quality Project	Lee County	\$2,137,814
Chapel Branch Improvements	Lee County	\$150,000
Cohn Branch Improvements	Lee County	\$268,000
Briarcliff Ditch Filter Marsh	Lee County/DOT	\$408,876
Island Park Filter Marsh	Lee County/DOT	\$2,268,000
Three Oaks Parkway Filter Marsh	Lee County/DOT	\$3,993,270
Halfway Creek Filter Marsh and Weir at US 41	Lee County	\$775,000
GP 1539-102R North Estero Blvd, Stormwater Treatment Project	Town of Fort Myers Beach	\$3,050,000

#### **Stormwater Quantity Initiative Projects**

Weir Structural Improvements	Cape Coral	\$1,500,000
Canal and Drainage Improvements	City of Bonita Springs	\$1,075,000
Manuel's Branch East Weir (Royal Palm)	City of Fort Myers	\$135,000
Carrel Canal East Weir (Royal Palm)	City of Fort Myers	\$135,000
City Industrial Park (FPL) Drainage Improvements	City of Fort Myers	\$160,000
Manuel's Branch West Weir (Grand Avenue)	City of Fort Myers	\$105,000
Manuel's Carrell Canal (Central/Evans Ave) Interconnect	City of Fort Myers	\$30,000
Winkler-Galloway Canal (Edison Mall/Evans Ave) Interconnect	City of Fort Myers	\$30,000
Cortez Culvert Replacement	City of Fort Myers	\$350,000
Harnes Marsh Caloosahatchee Water Quality & Flood Reduction, Construction	ECWCD	\$2.7M

Yellow Tail Structure Retrofit	ECWCD	\$500,000
Eagle Ridge/Legend Interconnect	Lee County	\$337,500
Briarcliff Channel Weirs	Lee County	\$163,503
Ten Mile Canal Pump Facility	Lee County	\$250,000
Alico Road Area Drainage Improvements	Lee County	\$498,312
Poling Lane Drainage	Lee County	\$1,200,000
Sunniland/9 Mile Run Drainage	Lee County	\$350,000
East Mullock Drainage District Weir Replacement and WQ Improvement	Lee County	\$600,000
Kehl Canal Weir Modification	Lee County	\$100,000
Ten Mile Canal/Hanson BMP Installation	Lee County	\$350,000

#### **Watershed Master Planning and Implementation Initiative Projects**

Spring Creek History & Maintenance Review	City of Bonita Springs	\$7,500
Broadway Stormwater System Evaluation	City of Fort Myers	\$30,000
Muse Analysis and Recon	Glades County	
North Fort Myers & Charlotte County Aerial Contour Mapping	Lee County	\$750,000
HMGP 1609-72 Basin Based Drainage Project Feasibility Evaluation & Planning Design & Construction	Town of Fort Myers Beach	\$1,580,390
Caloosahatchee Watershed Initiative-Feasibility	Town of Fort Myers Beach	\$65,000
Stormwater Master Plan	Town of Fort Myers Beach	\$250,000
Neighborhood Stormwater Improvements Implementation of Stormwater Master Plan	Town of Fort Myers Beach	\$1,900,000
Estero Blvd Rehabilitation, Stormwater Collection and Treatment Facilities, Planning Design & Construction	Town of Fort Myers Beach	\$33,220,000

#### **Habitat Assessment, Protection and Restoration Initiative Projects**

Greenbriar Wetland Re-hydration with STAs , Feasibility and Preliminary Design	ECWCD	\$150,000
Greenbriar Wetland Re-hydration Project, Construction	ECWCD	\$400,000
Four Corners Restoration, Hendry County's Portion	Hendry County	\$2,000,000
Nine Mile Canal	Hendry County	\$3,000,000
Restoration Oxbow 32 (Tully Dunlap Oxbow)	Hendry County	\$500,000
Ten Mile Canal Filter Marsh	Lee County	\$1,823,819



Gator Slough Channel Restoration	Lee County	\$882,483
Powell Creek Extension Flowway Restoration	Lee County	\$433,032
Spanish Creek Restoration	Lee County	\$433,032
Fichter Creek Restoration	Lee County	\$2,000,000
Water Table Monitoring Network, Installing Measuring Instruments & Telemetry	Lee County	\$535,140
Powell Creek Hydrologic Restoration (Sedimentation in the Natural Creek)	Lee County	\$765,369
Popash Creek Preserve, Restoration and Enhancement of 20/20 Land	Lee County	\$255,000
Four Corners Restoration, Lee County's Portion	Lee County	\$8,000,000
Strike Lane Wetlands/Retention Area	SCEWCD	\$500,000

**Outreach Initiative Projects**

Hendry/Glades County, Agriculture BMPs	Hendry/ Glades	\$500,000
Coastal Habitat and Hydrology Restoration of Canal System with Outreach, Phase II	SCEWCD	

**Funding Initiative Projects**

CHNEP protection and restoration efforts	CHNEP	\$50,000
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